Tajikistan: Country situation assessment

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PRISE
Pathways to resilience in semi-arid economies

Research for climate-resilient futures

Tajikistan: Country situation assessment

August 2015

Nailya Mustaeva

Heinrich Wyes

Benjamin Mohr

Abdulkhamid Kayumov

This Country Situation Assessment has been produced as part of a series of preliminary papers to guide the long-term research agenda of the Pathways to Resilience in Semi-arid Economies (PRISE) project. PRISE is a five-year, multi-country research project that generates new knowledge about how economic development in semi-arid regions can be made more equitable and resilient to climate change.

The Regional Environment Center for Central Asia (CAREC) is a PRISE Country Research Partner leading research activities in Tajikistan.

Front cover image:
A girl waiting in a car for the flood to be over.

Acknowledgements

CAREC would like to express its deepest gratitude to representatives of the PRISE Stakeholder Engagement Platform in Dushanbe, representing the Ministry of Economic Development and Trade, Ministry of Energy and Water Resources, Ministry of Agriculture, Ministry of Industry and New Technologies, Committee for Environmental Protection under the Government of the Republic of Tajikistan, State Administration for Hydrometeorology, academia, civil society organisations and international development partners, who provided valuable contributions to the assessment exercise, and suggested potential research topics to support climate resilience and development in Tajikistan.

The authors would also like to express their deepest gratitude to colleagues from the Overseas Development Institute (ODI) and Sustainable Development Policy Institute (SDPI) for providing coordination and guidance throughout the exercise. Last but not least, the team would like to thank Shamsi Myadieva and Firdavs Mavlyanov for their substantial support in translating, editing and fine-tuning the report.

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Acronyms

A/R	Afforestation and reforestation
ADB	Asian Development Bank
CAMP4CA	Regional Program on climate change adaptation and mitigation
CIF	Climate Investment Fund
CNPC	China National Petroleum Corporation
CO2	Carbon dioxide
EBRD	European Bank for Reconstruction and Development
EGDI	E-governance development index
EITI	Extractive Industries Transparency Initiative
EPI	Environmental Performance Index
EWE	Extreme Weather Events
GCW	Global Cryosphere Watch
GoT	Government of Tjikistan
HDI	Human Development Index
Hydromet	State Agency for hydrometeorology
ICSD	Interstate Commission for Sustainable Development
IFAS	International Fund for saving the Aral Sea
IMF	International Monetary Fund
IPY	International Polar Year
LSIS	Living Standards Improvement Strategy
MEDT	Ministry of Economic Development and Trade
MEWR	Ministry of Energy and Water Resources
MEWS	Monitoring and Early Warning System
NAP	National Action Plan of the Republic of Tajikistan
NAPA	National Adaptation Programs of Action
NDRMS	National Disaster Risk Management Strategy
NDS	National Development Strategy
NEAP	National Environmental Action Plan
ODI	Overseas Development Institute
PHC	Primary Health Care
PPCR	Pilot Program for Climate Resilience
PRISE	Pathways to Resilience in Semi-Arid Economies
PRS	Poverty Reduction Strategy
REACT	The Rapid Emergency Assessment and Coordination Team
SCR	Strategic Climate Fund
SDPI	Sustainable Development Policy Institute
SE4ALL	Sustainable Energy for All Initiative
SEP	Stakeholder Engagement Platform
SPCR	Strategic Programme for Climate Resilience

Executive summary

Tajikistan is a small landlocked country in the heart of Central Asia, bordered by Afghanistan, China, the Kyrgyz Republic, and Uzbekistan. The population of Tajikistan is 8.161 million (2014), which is 1.5 million more compared to 2004. Tajikistan's 2012 Human Development Index (HDI) of 0.622 is below the average of 0.64 for countries in the medium human development group and below the average of 0.771 for countries in Europe and Central Asia. Although living standards have improved over recent years, poverty remains a widespread phenomenon in Tajikistan.

Climate change is touching every aspect of the human development and livelihood. However, for some regions worldwide it is still a future projection. For Tajikistan, climate change is a part of daily reality, where the poor and marginalized people are the most vulnerable to its impacts. UNDP Human Development Report: Fighting climate change: Human solidarity in a divided world (2007/2008) states, "…we must see the fight against poverty and the fight against the effects of climate change as interrelated efforts. They must reinforce each other and success must be achieved on both fronts jointly."

The similar concept is envisaged within the new initiative Pathways to Resilience in Semi-Arid Economies (PRISE), which among other countries, targets Tajikistan as pilot. In order to understand the situation of the country development in times of climate change, it is important to track the progress around (i) existing development plans and policies, and key socio-economic developments; (ii) highlight present and future climate risks and their impact on socio-economic development and coping capacities of natural and human capital; and, finally, (iii) identify existing adaptation policies, practices and knowledge as well as reflect the challenges towards climate resilience and development in Tajikistan.

Development Context

Development plans and policies

The principle strategic documents, which the Government of Tajikistan (GoT) refers to nowadays is the National Development Strategy (NDS) for 2010-2015, with the main objective to sustainable economic growth and improved access to basic social services and poverty reduction. With its third phase of mid-term Poverty Reduction Strategy for 2010–2012 completed, the country is now implementing the Living Standards Improvement Strategy for 2013-2015, which considers several issues related to the achievement of multiple strategic objectives, such as public administration reform, rule of law, demographic projection and planning, regulation of labor migration, development of private sector, and supporting the middle class.

Key socio-economic trends

Tajikistan's economy performed strongly in the decade following the end of the civil war in 1997. Economic growth was moderated to 6.7 percent in the first half of 2014, down from 7.4 percent a year earlier, as activity slowed in almost all sectors. In 2013 record of high remittance inflows have been estimated at about 4.1 billion USD or equivalent to almost 49 percent of GDP, which accelerated the in-house private consumption and, to a lesser extent, investment. Yet, relatively weaker economic growth

globally and lower prices for aluminum and cotton – main strategic products – adversely affected Tajikistan's export performance, pushing total industrial growth below 3 percent (2013) from nearly 7 percent a year earlier (2012).

Energy and agriculture are considered among other development sectors, contributing to the country's GDP. Today over 98-99% of Tajikistan's energy production capacity is based on hydropower. However, this hydropower potential of about 4,412.7 megawatt remains mostly untapped with only 5% of its potential being used. The main large-scale hydropower projects are the Nurek and Sangtuda-1 (670 MW) hydroelectric power stations. More hydropower projects are at the development stage, such as the Rogun power plant (3.400 MW).

Being responsible for 64% of total employment and 21% of GDP, the agricultural sector in Tajikistan offers a solid foundation for economic development. The Government displays a strong commitment to the ongoing agricultural reform, although the pace of implementation must be accelerated to secure the productivity gains. The livestock economy rests primarily on forage crops and utilization of local pastures. The productivity of both sectors, agriculture and livestock, is relatively low, even compared to other Central Asian states.

The share of state expenditures for education and healthcare system in Tajikistan is very low. The total share on education in average makes up 3.8-4% of the country's GDP, which is about half of the 6% OECD average expenditure. For the last 15 years, the state share of expenditure on health, as a percentage of GDP, had constantly reduced from 4.5% (1991) up to 1.3% (2006), but in 2009 it raised to 1.9% and in 2014 to 2.3%. Limited budget and low salaries of teachers and doctors reveal other issues in education and health, such as lack of transparency and non-formal payments, quality of education and medical services.

Climate and Development

Climate risks and their impact on socio-economic development

By 2030 an average annual temperature is expected to increase by 0.2-0.4˚C in most areas of Tajikistan. This trend coincides with the tendencies observed in the country for the last 15-20 years. Climate risks and their impact on the key socio-economic sectors in Tajikistan are really threatening. The country witnesses around 500 of natural disasters every year [different magnitude and affect], which results in 20-100 million USD in losses and damages. Melting of glaciers, fluctuation of the main rivers runoff and its affect on hydropower production and agriculture are few among numerous phenomena of climate change impacts in Tajikistan. While in the past decades the total glacial area was recorded as 6% out of total country's territory, by 2013 this estimate equaled to 5%. This leads to changes in water availability and runoff. For example, the river runoff for the Aral Sea basin, which is formed in Tajikistan, nowadays is 53 cubic kilometers, which is 4 cubic kilometers less than fifty years before. Climate risks seriously undermine the agricultural development. For example, the drought of 2001-2002 caused a critical drop in crop yields by 30-40% in most dry farming areas, whereas the drought of 2008 led to 40% decline.

Natural and human capital

Coping capacities of the country to adapt are extremely low. Natural capital, even though possesses vast hydropower potential, has a

shortcoming in a heavily degraded environment. The estimates show that the environmental degradation is 10% of the country's GDP. Agriculture, which is heavily dependent on land resources and favorable climate conditions, is at particular risk. Large parts of the agricultural land are affected by erosion and salinization, while the quality of 97% of the arable land severely declined in the past 15 years. Human capital is also low and should be closely linked with a weak quality of education, limited knowledge and skills about climate change and adaptation, as well as migration with a number of by-side effects critically challenging human capital.

Implications for Adaptation Policy

National policies and institutions

The key national policy document, which addresses climate change adaptation and mitigation, is the National Action Plan of the Republic of Tajikistan (NAP) on climate change mitigation (2003).The principle governmental body responsible for coordination climate activities in Tajikistan is the State Agency for hydrometeorology, or Hydromet. The Committee for environmental protection under the GoT is charged with government control over natural resource use, land protection, subsoil, forests, water, and other resources. In the area of climate change, it oversees Hydromet.

Initiatives on climate adaptation and resilience

At present, the national climate adaptation agenda prioritizes hydropower, renewable energy, agriculture and forestry, as well as disaster risk management and provision of meteorological services. Most of them are implemented within the Pilot Program for Climate Resilience (PPCR), with an investment of around 50 million USD. The program is at its implementation phase, with a number of individual projects, which are operational both on the ground (community-based or sub-regional activities) and national level. PPCR Secretariat, which was created in 2011, is responsible for a regular coordination of the program related activities.

Challenges towards climate resilience and development

Despite the ongoing programs and investments on climate change adaptation and resilience in Tajikistan, there are still a number of challenges which hamper the progress. They are mostly associated with the mainstreaming of climate adaptation issues to the development policy and programs (e.g. national development and poverty reduction strategies) and deficiency of a targeted adaptation policy document[1]; lack of capacities (organizational, technical and individual), including institutional power in climate policy making; lack of awareness and education, finance and deficiency of the state budget for climate agenda, weak interagency coordination and communication, especially those most sensitive to climate risks (water, energy, agriculture, disasters, etc.); and lack of scientific evidence base and need for thematic research and studies.

[1] The National Strategy on climate change adaptation is in its development stage.

Forest belt along the river.
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1. Introduction

Climate change is no longer a future projection. Its adverse effects are a part of nowadays reality. Increased air temperature and extreme weather events, melting of glaciers, fluctuation of the sea level and growing risks to human health and security are the challenges, which hamper sustainable development and growth of many nations worldwide (IPCC 2007). Developing countries and countries in transitional economy are the most vulnerable to climate risks. Central Asia is not an exception (World Bank 2014c). According to IPCC "the projected decrease in precipitation in Central Asia will be accompanied by an increase in the frequency of very dry spring, summer and autumn seasons. Changes in seasonality and amount of water flows from river systems are likely to occur due to climate change. Changes in runoff of river basins could have a significant effect on the power output of hydropower generating countries like Tajikistan, which is the third highest producer in the world"(IPCC 2007).

The sensitivity to climate risks will become more prominent due to aridity of the region. In its fifth Assessment Report, IPCC (2014) adds that "Central Asia is expected to become warmer in the coming decades and increasingly arid, especially in the western parts of Turkmenistan, Uzbekistan, and Kazakhstan… Frequent droughts could negatively affect cotton production, increase already extremely high water demands for irrigation, and exacerbate the already existing water crisis and human-induced desertification in western Turkmenistan and Uzbekistan… Drought will likely compound the mismanagement of water resources and add to existing tensions especially in arid regions of Asia". Although all countries of Central Asia are highly differentiated by their development status, availability of mineral and natural resources and topography, they share common environmental challenges, which are intensively growing in light of climate change.

Tajikistan is unfortunate to be the most vulnerable in Central Asia and Eastern Europe (World Bank 2009). Being the least developed country of the post-Soviet Union with 1,000 USD GDP per capita (2013), where remittances of the labor migrants make up almost half of the country's GDP (49% in 2013) and poverty still remains a widespread phenomenon, Tajikistan experiences the hardship of a sustainable economic growth. Meanwhile, climate change is already an integral part of Tajikistan's everyday reality. Melting of the Pamir-Alai glaciers, intensified flash floods and mudflows, heavy rains and abnormal air temperatures put Tajikistan's security at risk. Aridity of the country only accelerates it. Due to geographic location and high inter-annual rainfall variability and dependence on snow melt, the country is already facing droughts and arid seasons.

The most territory of Tajikistan (143.1 thousand sq. km) is considered as arid/semi-arid. According to the climate reference book of Tajikistan, there are two main climate zones: (i) Arid [drylands], which cover the valleys of the south-western and northern Tajikistan, mountains of Turkestan range and deserts of the Eastern Pamir (50-300 mm per annum) and (ii) Semi-arid zones [insufficient humidity, with up to 900 mm per annum], which cover the rest of the territory. Around 1% of the territory is considered as the one with sufficient humidity (1500 mm per annum). With climate change the level of aridity will undoubtedly grow and pose a serious challenge to food security and agriculture.

Climate change and its impacts on socio-economic development are becoming well-recognized in the country. Hence, the Government of Tajikistan with the support of international development partners focuses its efforts to reducing vulnerability and moving towards a climate-resilient path. At present, the national climate adaptation agenda prioritizes hydropower, renewable energy, agriculture and forestry, as well as disaster risk management and provision of meteorological services. Most of the adaptation projects are implemented in the southern parts of the country, and to a less extent – in the northern and eastern sub-regions. Such distribution is mostly explained by a higher vulnerability of the rural population and location of strategic objects and infrastructure. Yet, adaptation projects at the local and community level should be further prioritized.

At present, key adaptation initiatives in Tajikistan are implemented within the Pilot Program for Climate Resilience (PPCR), with an investment of more than 50 million USD[2]. Currently, the program is at its implementation phase, with a number of individual projects, which are operational both on the ground (community-based or sub-regional activities) and national level. The regular projects on preparation of the National Communications under the UNFCCC are also considered as part of adaptation initiatives. In its

[2] PPCR is led by multi-development banks World Bank, Asian Development Bank and European Bank for Reconstruction and Development. See more details at www.ppcr.tj

Third National Communication (2014), the Government of Tajikistan was able to perform a stocktaking analysis of vulnerability and adaptation of the key economic sectors, natural ecosystems and human health in light of recent developments and climate trends in the country. On the other hand, the Regional Program on climate change adaptation and mitigation (CAMP4CA), which is under the preparatory stage and led by the World Bank team, also foresees investments for the national projects[3], aiming at climate change adaptation/mitigation (country-demand driven approach), especially in two priority sectors, like (i) Agriculture and Land Management and (ii) Water Resources and Management.

The Pathways to Resilience in Semi-Arid Economies (PRISE) is a new five-year, multi-country research project that generates new knowledge about how economic development in semi-arid regions can be made more equitable and resilient to climate change. PRISE aims to strengthen the commitment of decision-makers in local and national governments, businesses and trade bodies to rapid, inclusive and resilient development in these regions. It does so by deepening their understanding of the threats and opportunities that semi-arid economies face in relation to climate change. PRISE research targets semi-arid areas across six countries in Africa and Asia: Burkina Faso, Senegal, Tanzania, Kenya, Pakistan and Tajikistan.

The present Country Situation Analysis Report for Tajikistan is one of the key outputs of the PRISE inception phase (1 year). The main objective of the report is to summarise the current situation of the country development and prepare the ground for the research phase (2-5 years) in close consultation with the national stakeholders[4]. The report proceeds in the following thematic sections: (i) Development context, which reviews Tajikistan's key development plans (national development strategy, poverty reduction strategy; respective policies and plans) and socio-economic trends; (ii) Climate and development, which reflects how climate change current and future risks challenge the key economic sectors and human health and what are the capacities of natural and human capital to cope with risks; (iii) Implications for adaptation primarily identifies existing adaptation policies, practices and knowledge as well as highlights the challenges towards climate resilience and development in Tajikistan.

"Melting of the Pamir-Alai glaciers, intensified flash floods and mudflows, heavy rains and abnormal air temperatures put Tajikistan's security at risk."

[3] The overall program budget envelope is ca. 57 mln USD [Component 1: regional = ca. 20 mln, Component 2: national investment envelope = ca. 37 mln].

[4] Adapted from the templates for the PRISE Inception Outputs

2. Development context in Tajikistan

2.1 Development plans and policies

Development and poverty reduction strategies

The principle strategic documents, which the Government of the Republic of Tajikistan (GoT) refers to nowadays is the **National Development Strategy** (NDS) for 2010-2015[5]. NDS defines priorities and policies of the GoT, which aim at sustainable economic growth and improve the access to basic social services and poverty reduction. The National Development Strategy also serves as a tool for accelerating a dialogue between the private sector and civil society.

The strategic document, which focuses on poverty alleviation, is the **Living Standards Improvement Strategy for 2013 – 2015**. With its third phase of mid-term Poverty Reduction Strategies for 2010–2012 completed, the country is now implementing the Living Standards Improvement Strategy, which considers several issues related to the achievement of multiple strategic objectives, such as public administration reform, rule of law, demographic projection and planning, regulation of labor migration, development of private sector, and supporting the middle class.

The **Poverty Reduction Strategy** (PRS) for 2010 – 2012 served as a medium-term programme for the implementation of the National Development Strategy (NDS, 2010 – 2015). The PRS indicates concrete actions for institutional and economic reforms that promote strong and sustainable economic growth, and for the improvement of social services aimed at mitigating the burden of poverty in the country.

[5] All documents are available at http://www.tj.undp.org/content/tajikistan/en/home/operations/legal_framework/

Box 1: Reflections of climate change in strategic documents

Assessment of strategic documents in terms of their inclusion of climate change adaptation showed that the National Development Strategy, which covers the period 2007-2015, does not mention climate variability and climate change explicitly (UNDP 2012a). However, the NDS includes environmental sustainability as a key target, and identifies problems that are directly related to climate variability and climate change adaptation.

While the Poverty Reduction Strategy represents a step forward by mentioning climate change issues and acknowledging potential climate-related issues that affect water resource management, both the National Development Strategy and the Poverty Reduction Strategy have the following gaps:

- Neither strategy clearly links climate change and climate change adaptation explicitly to key, climate-sensitive production sectors, such as agriculture
- Even in the Poverty Reduction Strategy, discussion of climate change issues is almost exclusively limited to the environmental management sector and is not mainstreamed into broader poverty alleviation language

The strategies fail to note or include climate change adaptation considerations in proposed sectoral measures and targets, even when these targets are directly affected by climate variability and climate change.

2.2 Socio-economic development

The state of economy overview

Tajikistan was the poorest and most underdeveloped part of the Soviet Union until its collapse in 1991. Until the mid-1990s, the agricultural and industrial production dropped to about one-third of the level of 1991. In the same course uncontrolled public debt led to hyperinflation. The main reasons for this decline were the collapse of the Soviet Union, elimination of subsidies amounting to half of Tajikistan's state budget and the loss of the intra-Soviet markets (Olcott 2012).

Following this severe post-independence drop in most socio-economic indicators and the 1992-1997 civil war, Tajikistan experienced a steady recovery. In the late 1990s the economy intensified its activities for the reconstruction and development of Tajikistan with support of major multilateral donors such as the World Bank (WB), the International Monetary Fund (IMF), the Asian Development Bank (ADB), and the

European Bank for Reconstruction (EBRD).

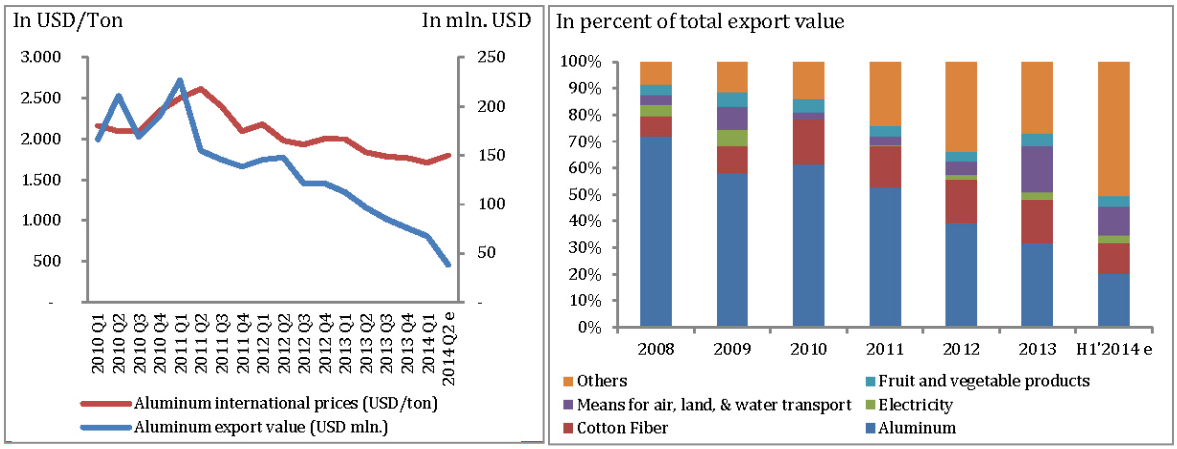
Although living standards have improved over recent years, poverty remains a widespread phenomenon in Tajikistan. There are different factors affecting the poverty rate in Tajikistan, including **external factors** such as a landlocked territory, remoteness from the markets, regional instability, illicit drug trafficking and a risk of terrorism. There are also some **internal factors** such as low competiveness, high population growth rates, environmental degradation and depletion of the accumulated human and physical capital, which have a negative impact on the country's development (UNDP 2012). Please, see the Annex 1 for the key socio-economic indicators in Tajikistan over the past years.

Growth versus stagnation

Tajikistan's economy performed strongly in the decade following the end of the civil war in 1997. Strong economic growth, which averaged nearly 8 percent per annum during 2000-2008, was made possible by a favorable external environment, with world prices for country's main export items of cotton and aluminum soaring. Rapid growth in Russia and other trading partners have boosted the demand for Tajik labor, which resulted in growth of remittances and a subsequent increase in domestic consumption. Internally, the Government's efforts in stabilizing the economy allowed for existing businesses and households to take advantage of emerging opportunities. On the other hand, the marked improvement in the security situation led the Tajikistan's economy into a phase of growth. Poverty rates have fallen from a peak of 80-83% in 1999-2000 to 32% in 2014 (using the World Bank's minimum poverty standard).

Tajikistan's economy grew by 7.4 percent in 2013, and its economic growth was moderated to 6.7 percent in the first half of 2014, down from 7.4 percent a year earlier, as activity slowed in almost all sectors (Table 1). Meanwhile, relatively weaker economic growth globally and lower prices for aluminum and cotton – main strategic products – affected adversely Tajikistan's export performance, pushing total industrial growth below 3 percent from nearly 7 percent a year earlier (World Bank 2014a). See Figure 1.

Figure 1: Export of aluminium and other products



Source: *Adapted* from the Word Bank 2014a.

Table 1: Selected macroeconomic indicators for Tajikistan, 2013-16

(Percent of GDP unless otherwise indicated)				
	2013 [a]	2014 [a]	2015 [b]	2016 [b]
Real GDP growth	7.4	6.7	6.0	6.3
CPI inflation (end-of-period percent change)	3.7	7.0	7.5	7.5
Overall revenues and grants	28.1	28.0	27.6	28.0
Expenditures and net lending	29.2	29.0	29.1	29.4
Overall fiscal balance	-1.1	-1.0	-1.5	-1.4
Total public and publicly guaranteed external debt	25.8	25.8	26.5	26.1
Current account balance	-0.7	-3.7	-3.9	-3.8

Source: Ministry of Finance, TajStat, Ministry of economic development and trade, IMF, World Bank staff estimates.

Notes: [a] Estimates. [b] Projections. Adapted from the World Bank 2014a

It is known that over the recent decade, labor migrants' remittance constitute a significant share of the country's GDP. In 2013 record of high remittance inflows have been estimated at about 4.1 billion USD or equivalent to almost 49 percent of GDP, which accelerated the in-house private consumption and, to a lesser extent, investment. Lower inflows of remittances, due to the slowdown in Russia, have translated into lower domestic demand and slower growth in services and housing construction. Though growth in agricultural output also moderated due to heavy rains and low temperatures, it was still a healthy 6 percent. Fixed investment grew swiftly as the public investment program got underway.

As the international financial crisis broke in late 2008, Tajikistan was already affected. The winter 2007-08 was extremely cold, so that as a result of energy and food shortages international relief efforts took place. Similar to other economies in the region, the 2009 global economic crises adversely affected Tajikistan. The effect came through a sharp decrease in remittances and decline in exports of its main commodities. The combination of government's tighter fiscal policy, currency depreciation, and increased support from the development partners helped mitigate the adverse impacts of the crises. As a consequence the GDP has bounced back to 6.5 percent in 2010 from a low of 3.9 percent in 2009.

The international financial crisis led to a consolidation phase, but also underlined that the Tajik economy lacks a solid foundation. Its macroeconomic fundamentals are based to a very high percentage on labor migration as well as on two export goods both manufactured until today by state-owned enterprises, i.e.: (i) Aluminum, which provides about half of export earnings. While Tajikistan itself has no mineable bauxite reserves, the large aluminum smelter stems from the Soviet era, and (ii) Cotton, which makes approx. 15% of the exports. The prices of both goods on the world market are volatile.

Other key development sectors

Energy and agriculture are considered among other key development sectors that contribute to the country's GDP. Today over 98-99% of Tajikistan's energy production capacity is based on hydropower. Yet, this hydropower potential of about 4,412.7 megawatt remains mostly untapped with only 5% of its potential being used. The main large-scale hydropower projects are the Nurek and Sangtuda-1 (670 MW) hydroelectric power stations. More hydropower projects are at the development stage, such as the Rogun power plant, 3,400 MW (UNDP 2012c). Unlike some of its neighbors, Tajikistan did not have large proven oil or natural gas reserves until the early 2010s. In late 2010, however, Russia's Gazprom announced that Tajikistan had several potentially significant gas fields.

Box 2: Compound crisis of 2007-2008

The winter period of 2007-2008 known as *compound crisis* was critical for Tajikistan's socio-economic security. Extremely and abnormally low air temperature coupled with an acute energy deficit dramatically challenged life and security of people, triggered both significant losses in livestock, and reduction of agricultural productivity, and risked the food security. Data records of the Tajik Hydromet showed that snowfalls during the winter was 245% more than average, while the air temperature in January fluctuated between -15°C (daytime) and -25°C (at night), compared with an annual mean temperature of -1°C and 3°C. Such harsh winter had not been seen over the past 50 years.

At the same time, the energy production, which depends on hydropower resources (98-99%) critically declined. The blackouts were a usual phenomenon in Tajikistan. Many rural villages received only 1-3 hours of electricity per day. Existing energy insecurity, water and food risks and reduced economic growth resulted in a humanitarian crisis. The efforts from the government and international community to respond to a disaster were insufficient, and as a result, millions of people remain without electricity during a harsh winter. In the next months, the compound crisis was aggravated by the increased food prices and drought, which lasted for the whole spring and summer in 2008. The economic loss from compound crisis exceeded 250 million USD, or 7% of Tajikistan's GDP.

Compound crisis did not leave the social sector alone. With no heat in schools, children were not expected to learn. Students' learning was severely jeopardized by their discomfort and the increase in the rate of sickness from the extreme cold. Much ground was lost for the academic year. Access to basic healthcare services was severely reduced as many hospitals and health centers closed or worked during restricted hours, and in some cases discharged the patients, as the severe weather limited the availability of electricity, heating and running water.

As of early 2013, Gazprom was still drilling a huge well to reach what it expected to be more than 60 billion cubic meters of natural gas in southern Tajikistan. In exploration company, raised the estimate of its potential resources in the southwest of Tajikistan to 27.5 billion barrels of oil equivalent (3.2 trillion cubic meters of gas and 8.5 billion barrels of oil). Several months later, Tethys Petroleum signed an agreement with France's Total and the China National Petroleum Corporation (CNPC) to jointly develop oil and gas assets in Tajikistan.

Being responsible for 64% of total employment and 21% of GDP (World Bank 2013), the agricultural sector in Tajikistan offers a solid foundation for economic development. The Government displays a strong commitment to the ongoing agricultural reform, although the pace of implementation must be accelerated to secure the productivity gains that Tajikistan needs to improve the agricultural growth rate. Agricultural land in Tajikistan amounts to just over 5% of its territory, with large parts affected by erosion and salinization. The Ministry of agriculture has estimated that the quality of 97% of the arable land declined over the past 15 years. The livestock economy rests primarily on forage crops and utilization of local pastures. The productivity of both sectors, agriculture and livestock, is relatively low, even compared to other Central Asian states.

Governance and participation

The Government of Tajikistan pays a serious attention to promote the principles of good governance in the country's development process. The long-term NDS and the Public Administration Reform Strategy adopted by the Government of Tajikistan in 2006 and mid-term Living Standards Improvement Strategy (LSIS, 2013-2015) and Judicial and Legal Reform Programme (2013-2015) are among the main strategic development frameworks to support the initiated reform process (UN 2014). They reflect measure to strengthening governance and rule of law, institutions, systems and structures towards greater transparency, accountability and effectiveness.

Introducing elements of e-governance in planning and decision making processes is seen as a core measure to meet the above objectives, however the area remains underdeveloped due to insufficient technical, financial and human capacities of the country to promote, develop and implement policies and procedures based on elements of e-governance. This is confirmed by the recent UN e-governance survey which ranks Tajikistan 129th out of 192 countries, with overall **e-governance development index** (EGDI) of 0.3395. The e-participation component of the index is lowest, ranking Tajikistan 158th country due to considerably low e-information (extent to which the information is passed by the government to citizens), e-participation (extent to which citizens are consulted with), e-decision making (extent to which citizens are engaged in decision making process) rankings.

In view of the abovementioned, the e-governance is one of the key pre-requisites of a smart system of governance and development, which takes into account transparency, trust, and accountability of decision making process (outreaching socio-economic sectors) and positively impacts on overall planning and development.

Investment climate and private sector

Transparency International ranks Tajikistan in its Corruption Index for 2013 as 154 out of 177 countries. According to recent estimates by the IMF (2012) the volume of the shadow economy is estimated to be around 30% of the Tajik GDP.

Due to poor governance and the inadequate investment climate a noticeable restraint for private investments prevails. Private foreign direct investment stagnates at the low level of less than 5% of GDP for years. Tajikistan was ranked 139 among 178 countries. The Doing Business Report of the World Bank classifies the country in 2014 in terms of its business friendliness as number 143 of 189 countries. The weakly developed SME sector currently employs 50% of all workers employed in the country.

The legal and institutional framework necessary for a functioning market economy is in place. With support from international financial institutions, Tajikistan has been reforming its economy to enhance business activity and increase the SME sector. These reforms landed Tajikistan among the top 10 reforming countries in the World Bank Doing Business report for two consecutive years, in 2010 and 2011.

However, legislative and procedural rules regulating market competitiveness are still often ignored. Price setting, state subsidies and corruption continue to shape the domestic economy. There is considerable state intervention in the agricultural sector, which employs about half of the labor force and generates approximately 19% of GDP (as of 2011, down from 23% in 2010). Cotton-producing areas face mandatory targets in cotton cultivation and harvesting, and cotton is bought at prices fixed by the government.

Most basic regulations to prevent monopolistic structures and conduct are in place. An antimonopoly agency also exists, but it has generally been a marginalized body with little effective power. The agency's interventions are largely limited to

"Agriculture is responsible for 64% of the total employment and 21% of the GDP in Tajikistan."

preventing unwarranted increases in food prices prior to major holidays. The state itself is still the main monopolist, controlling key sectors of the economy through the so-called "natural" monopolies. These monopolies shield from competitive pressure broad sectors of the economy defined as significant to national security.

Foreign trade is liberalized in principle, but significant exceptions remain, including differentiated tariffs and special rules for state-controlled export commodities, such as aluminum and cotton. One latent indication of liberal trade policy is the country's negative current-account and trade balances in recent years. In 2010, the current-account balance recorded a surplus of 2.1% of GDP, before shifting to a deficit of 2.3% of GDP in 2011. The IMF forecast the deficit to grow to 3.6% in 2012. The trade deficit stood at 1.97 billion USD, or 35% of GDP, in 2010, and increased to 2.99 billion USD, equivalent to almost 46% of GDP, in 2011. The IMF expects the deficit to reach 3.27 billion USD, or an estimated 45% of GDP, in 2012.

Formal tariff barriers and quantitative restrictions are quite low, but there are significant informal barriers, particularly in customs corruption. However, to ensure further growth, land reform needs to be strengthened, issues of structural debt and dependency addressed, and freedom to farm guaranteed. The informal economy constitutes about a third of GDP, providing employment to more than 40% of the working population. Tajikistan's currency, the somoni (TJS), is fully convertible.

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preventing unwarranted increases in food prices prior to major holidays. The state itself is still the main monopolist, controlling key sectors of the economy through the so-called "natural" monopolies. These monopolies shield from competitive pressure broad sectors of the economy defined as significant to national security.

Most of these monopolies, particularly in energy and transport, are undergoing gradual restructuring and privatization, with little transparency and competition. For example, the Tajikistan Aluminum Company (Talco) is fully state-owned, lacks meaningful corporate governance. It constitutes around 60% of Tajikistan's exports and 40% of its electricity usage.

Challenges towards economic stability

Tajikistan's development to economic independence and stability is still far, especially as its domestic economic base still shows little substantial change. It is a low-wage country with widespread poverty. Tajikistan's biggest challenge in the coming years will be to increase its low rates of private investment. The rate of private investment has stagnated at around 5 percent of the GDP. The Government's strategy has made removing binding constraints to private sector development a key priority to foster economic growth, and several key achievements have been made to date.

In addition, implementation of the Extractive Industries Transparency Initiative (EITI) has also been high on the Government's agenda, to capitalize on Tajikistan's comparative advantage in mining. Yet, the development of the private sector and the appropriate legal framework for its growth remain a work in progress, and their successful realization is critical to help the Government achieve its ambitious growth targets.

Tajik labour migration is potentially an economic risk factor as it depends on the Russian market. High social costs, coupled with the lack of reforms in the private sector turns Tajikistan unattractive for direct investments. Additional risks include the rising external debt since 2005 (mid-2011 to over USD 2 billion estimated), the increasingly negative balance of trade, and that finance public investment derive almost exclusively from the development aid. In 2011, according to IMF data, Tajikistan attracted only 11 million USD in direct investments, but had an influx of about 200 million USD of foreign aid and 3 billion USD in return transfers.

Population

Tajikistan is faced with a young and rapidly growing population. The recent statistics showed that it amounts to 8,161 million people in 2014 (as of 1 January 2014, Statistic Agency), which is 1.5 million more compared to 2004. In overall, the total population in the past 60 years increased by more than five times. The annual growth is 2.3%. The biggest city is Dushanbe with the population of 778 thousand people (as of 1 April 2014, Statistic Agency). The population of Tajikistan is the youngest in Central Asia, with the average age of 25 years old.

The largest density of population (90-110 pers. per sq. km) is found in northern, central and southern part of the country with the most developed agriculture and industrial processes. The less dense territory is Pamir (3 pers. per sq. km), the sub-region with the main mountain and glacial zones. The population density in Dushanbe city is 5905 pers. per sq. km. The country is not urbanized. Only 26.6% of population lives in towns, while the remaining part is rural. The main reason is agricultural activity and farming.

Tajiks, the core population of the country comprises 85% of the total population. The state language is Tajik (Persian language group), while Russian still remains the language of international communication and cooperation. In the northern part of the country, people speak Uzbek (14%), whereas in the eastern territories, the Pamiri dialect and Kyrgyz language prevail.

In accordance with IOM data, the level of unemployment in Tajikistan is 10.8%. While the government's ban on child labor in the cotton harvest (2010) seems to be largely effective, poor households still cannot do without such supplementing their income – as a 2012 published follow-up study indicated. Finally, it should be remembered that a large number of professionals and well-trained specialists have left the country already in the 1990s and until today could not be replaced. No doubt this phenomenon complicates the implementation of modernization projects.

Education

Since 1997, the Government of Tajikistan made significant attempts to improve the country's fragile education system. Initial education reforms aimed to improve financial predictability and to align national policies with budget allocations. National Strategy for Development of Education (2006-2015) focuses on the following segments, like improvement of management, quality of education, equitable access to education and improvement of physical infrastructure. Nevertheless, the progress is very low mostly due to limited state budget. The total expenditure on education makes up 3.8-4% of its GDP, which is up from 1999 (2.2%). Such level of spending, which is about half of the OECD average expenditure of about 6%, is severely inadequate to meet the requirements of the country's high-needs education.

Tajikistan's 2012 HDI of 0.622 is below the average of 0.64 for countries in the medium human development group and below the average of 0.771 for countries in Europe and Central Asia. This indicates that Tajikistan has an HDI, which is the lowest in Central Asia and Europe (UNDP HDR 2013). At the same time, the country has an impressive adult literacy rate of nearly 100%, but this figure is almost certainly an exaggeration and masks serious discrepancies in education quality and access.

Health

Resources are extremely limited in the healthcare system of Tajikistan. For the last 15 years, the state share of expenditure on health, as a percentage of GDP, had constantly reduced from 4.5% (1991) up to 1.3% (2006), but in 2009 it raised to 1.9% and in 2014 to 2.3% (UNDP HDR 2013). Though Government approved the system of provision of State Basic Benefit Package, funds allocated from the state budget are not sufficient to cover this package. This issue may not fully be relevant to the private health facilities. On the other hand, some positive trends are observed in guaranteeing health services by the government. For example, the Mid-Term Expenditure Framework for 2015-2017 prioritizes immunization, TB prevention and control, as well as youth friendly health services, which are, though partially, expected to be funded by the state budget (UN 2014).

The rate of HIV/AIDs disease is relatively low in Tajikistan. The country achieved steady results in combating HIV/AIDs, Tuberculosis (TB) and Malaria. According to the data of the National Program, there is a notable decrease from 38.3%/2012 to 13.8%/2013 in the share of Injected Drug Users out of the total number of new

HIV cases. TB incidents decreased to 67.7 per 100000 (80 per 100000/2010). Only 13 malaria cases were identified in 2013, compared to 32 in 2012 (UNDP ROAR 2013).

One of the main priorities in health sector reform is the strengthening of Primary Health Care (PHC) with improved access (particularly in remote rural areas) to health services. However, it has poor infrastructure, inadequate resources (financial, human, medicine, basic medical equipment etc.) and lack of qualified medical staff and doctors. The sanitary and hygienic conditions of the PHC in the regions are at a very low level, and 51.6% (ADB, 2007) of the PHC are estimated as unsatisfactory. Some services are still not integrated into the function of PHC and they exist as vertical programmes (e.g. HIV prevention, prevention of non-communicable diseases, TB).

Principles of sustainable development and green economy

World Bank ranks Tajikistan 160th among 200 countries of the world in terms of specific carbon dioxide (CO2) emissions (TNC 2014). Greenhouse gas emissions per capita are 0.4 ton, while the share of the country's emissions in the Central Asian region is just 1% (World Bank and TNC, 2014). This is primarily attributed to the widespread use of hydropower resources that provide clean energy, relatively low fuel combustion by vehicles and use of gas fuel, and restructuring of the industrial sector.

Tajikistan's social and economic development is supposed to consider environmental protection and rational use of natural resources. In this regard, the Government has developed a number of legislative and regulatory documents to support the path towards sustainable development. For example, the Concept towards transitioning to sustainable development of the Republic of Tajikistan (2007) envisages all three pillars of social and economic growth and protection of environment. Yet, environmental concerns in Tajikistan still receive occasional consideration and are largely subordinated to economic growth efforts.

Tajikistan is strongly dependent on natural resources. However, the state of environment remains the biggest challenge towards sustainable development, especially for agricultural sector. Environmental degradation as a result of soil erosion, water pollution and deforestation increasingly constrains economic growth. Since almost all area of Tajikistan is considered as arid and semi-arid, these impacts are especially pronounced with climate change and increased aridity (World Bank 2014c). Climate change, on the other hand, increases the incidence of drought and extreme weather conditions, and accelerates melting of glaciers, eroding the resilience of poor communities. Coupled with outdated infrastructure and other factors, environmental degradation and climate change increase the intensity and frequency of natural disasters in the country.

With its diverse natural resources, the country, however, can successfully achieve sustainable economic development. Having rather limited hydrocarbon resources, Tajikistan, using the concept of a "green" economy, can choose a new model of economic development, i.e. use of all natural resources on the basis of wide application of "green" technologies, strengthen the state of power, ensuring political stability, security and social equity.

This is consistent with the implementation of the Sustainable Energy for All Initiative (SE4ALL) launched by the UN General Secretary with the aim to create conditions for the reproduction of other countries' successful experiences. In response to SE4ALL and to further stimulate national policies and legislation on sustainable energy, Tajikistan defined three main targets (i) Access to energy: ensure access to regular and reliable electricity to 5.6 million people, living in rural areas of Tajikistan; (ii) Energy Efficiency: reduce energy losses up to 10% in power grids and up to 20% in thermal grids, as well as increase the efficiency of energy use in all economic sectors, irrigation systems and final users up to 20% against the baseline, and (iii) Renewable Energy Sources: increase energy production from renewable energy sources up to 20% against the baseline (UNDP 2012b).

Further development of power engineering and construction of water reservoirs in Tajikistan, in cooperation with the interested neighboring states in the region, may become a solid foundation for sustainable development and joint transition to a "green" economy. However, apart from the development of large hydropower plants[6], it is important to consider the construction of micro and small hydroelectric power plants. Although unit costs of small hydropower plants are higher than those of large hydroelectric power plants, they are still very critical for power supply to the isolated mountainous areas remote from high voltage transmission lines. Development of these resources will provide multiple benefits: supply of the population with accessible electric power, decreased logging of mountain forests, decreased greenhouse gas emissions in a result of the reduced use of coal as fuel, and increased well-being of the mountainous areas' population.

[6] Rogun power plant (3,400 MW) is an ambitious project. If constructed, it will be the tallest dam in the world, and operate all year around, significantly expanding Tajikistan's electricity output

Development of hydropower Development of hydropower capacities is also important for promotion of “green” jobs in Tajikistan. The estimates of the Association of Energy Engineering Specialists of Tajikistan indicate that the development of small power enables creation of 40 new jobs per each megawatt of energy supply. If, in addition to small-scale energy development, Tajikistan also prioritizes and implements a policy of increasing employment, the positive effects will be even greater – each megawatt of energy would create 80-100 jobs. If every rural family in Tajikistan is provided with additional electricity of 1-2 kilowatts per day, it would lead to 15-25% poverty reduction (UNDP 2012c).

Access to energy is a catalytic factor that would unlock the bottlenecks and accelerate the sustainable development in Tajikistan. Energy supply needs to be enhanced to improve drinking water supply to villages, improve sanitation in urban and rural areas, develop domestic industries, expand the rural non-farm sector, reduce the prevalence of infectious and other diseases and increase sustainable provision of social services, especially in rural areas and areas with high proportion of vulnerable groups.

“If the global climate warming continues, air temperature might increase from -0.7ºC to 1.4-3.0ºC in the Pyanj River Basin by the end of the 21st century.”

Water resources of Tajikistan
© Timur Mustaev

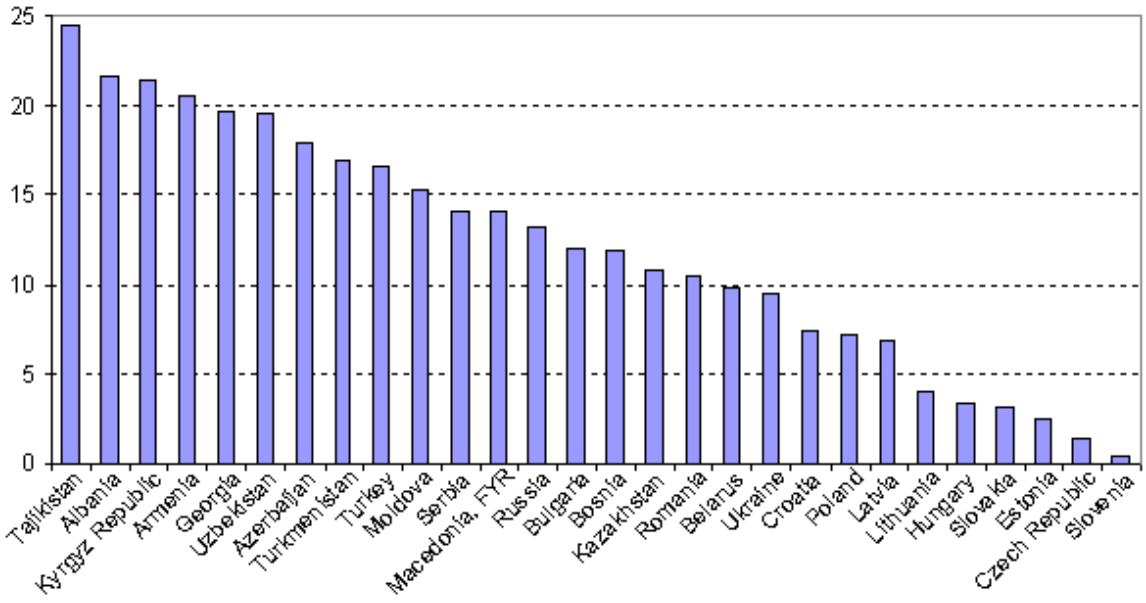
3. Climate and development in Tajikistan

3.1 Climate risks and socio-economic development

Climate change indicators

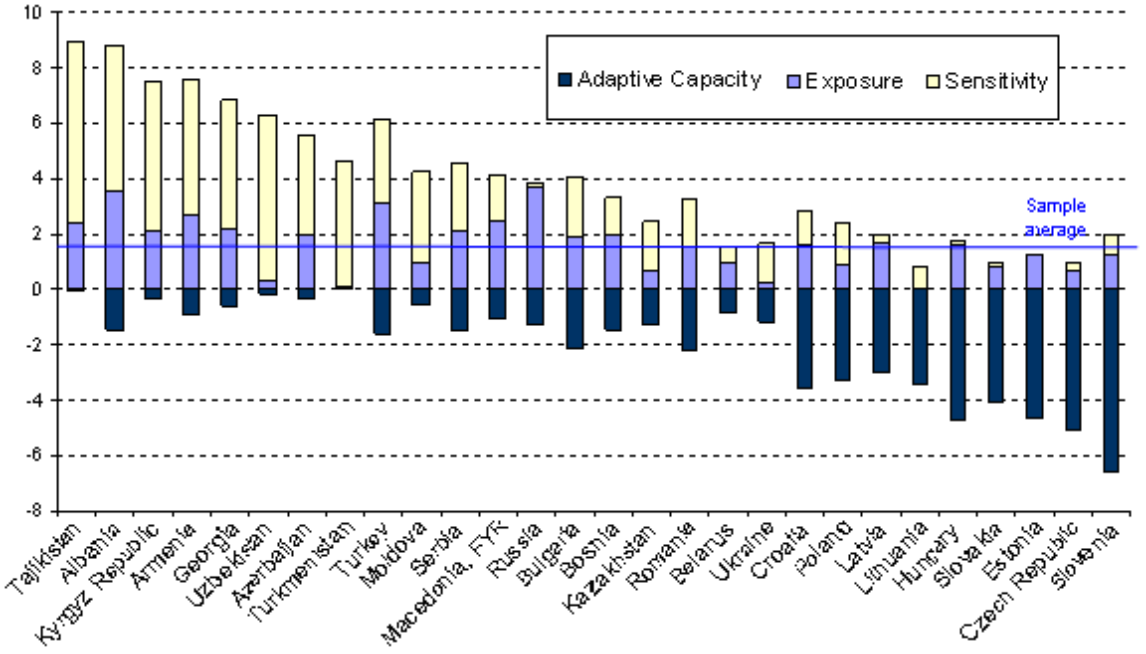
Tajikistan is unfortunate to be the most vulnerable country to climate change risks in Europe and Central Asia (World Bank 2009). The reasons for this indication are the high susceptibility of the country to climate induced impacts (see Figures 3 and 4 below) and extremely low capacity to cope with the risks (UNDP 2012a). The country faces a serious challenge to promote economic and social development in light of climate change and limited resources that it possesses to respond to risks.

Figure 2: Climate change vulnerability index



Source: Adapted from the World Bank 2009

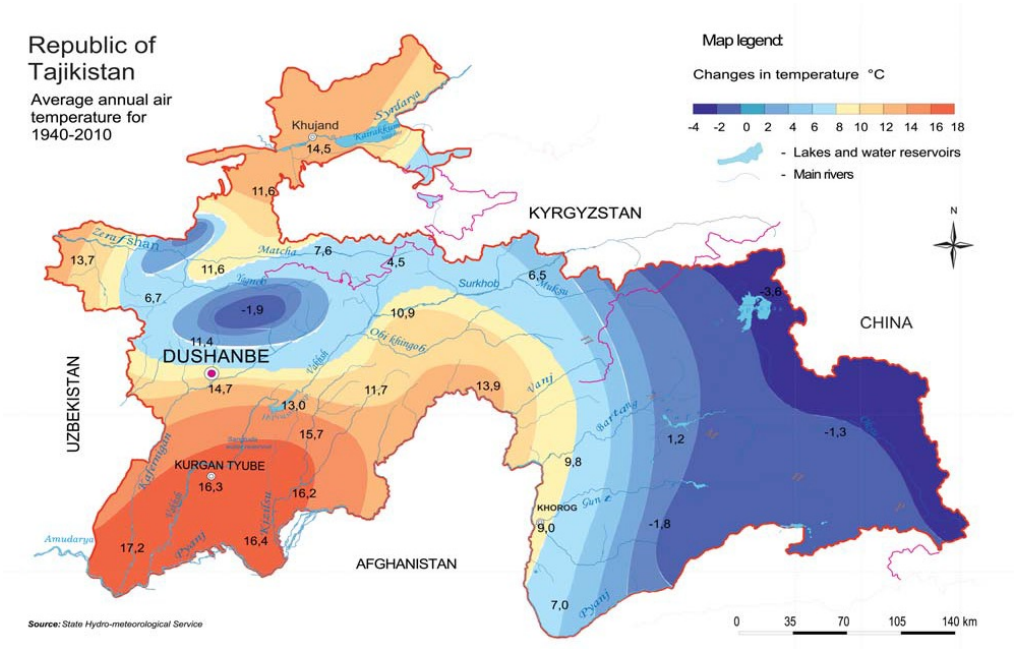
Figure 3: Drivers of climate change vulnerability



Source: Adapted from the World Bank 2009

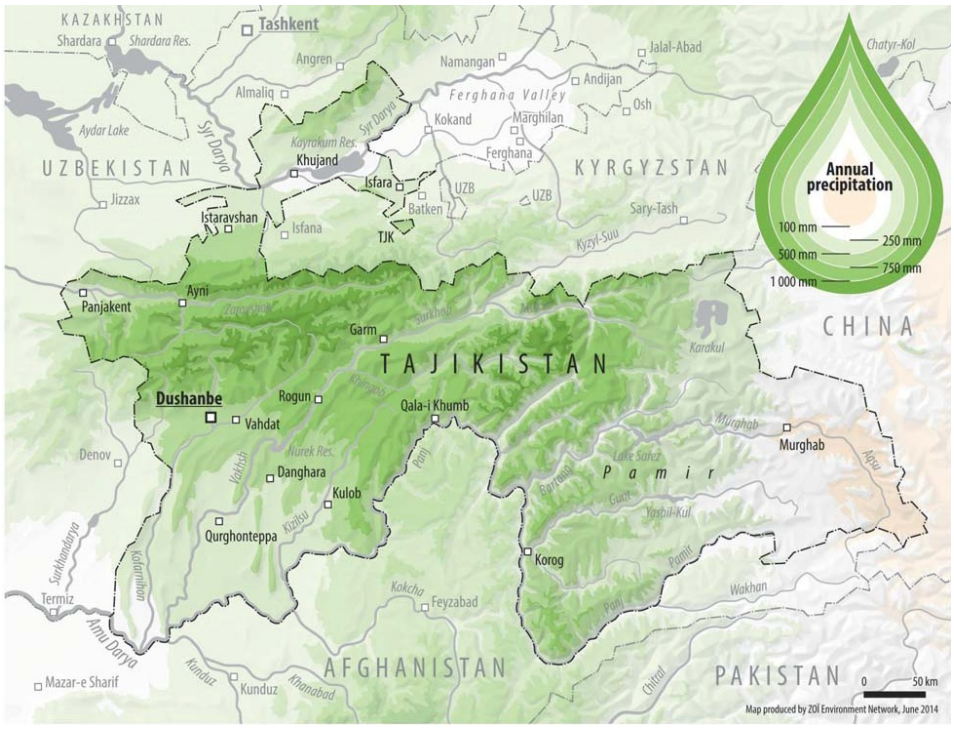
Susceptibility of Tajikistan to climate change is exacerbated by a high level of aridity, which is predominant factor for the most territory of the country. Both plain and mountains areas are arid or semi-arid, and experience insufficient precipitation norms (Asanova, pers.com. 2015). Recent hydrometeorological observation records show that in the past 50-70 years the annual mean temperature for the *plain areas* increased by 0.1-0.2 ˚C per a decade (TNC 2014). For example, the most prominent increase of temperature was observed in Dangara (southern part, arid zone) and Dushanbe (central part, arid and semi arid zone). In *mountain sub-regions* [below 2500 masl] the annual mean temperature increased by 0.3-0.5˚C, while in *high-mountain areas* [above 2500 masl] the increase constituted by 0.2-0.4˚C. See the map of average annual air temperature and precipitation patters for 1940-2010 (Figure 5.).

Figure 4: Average annual air temperature for 1940-2010



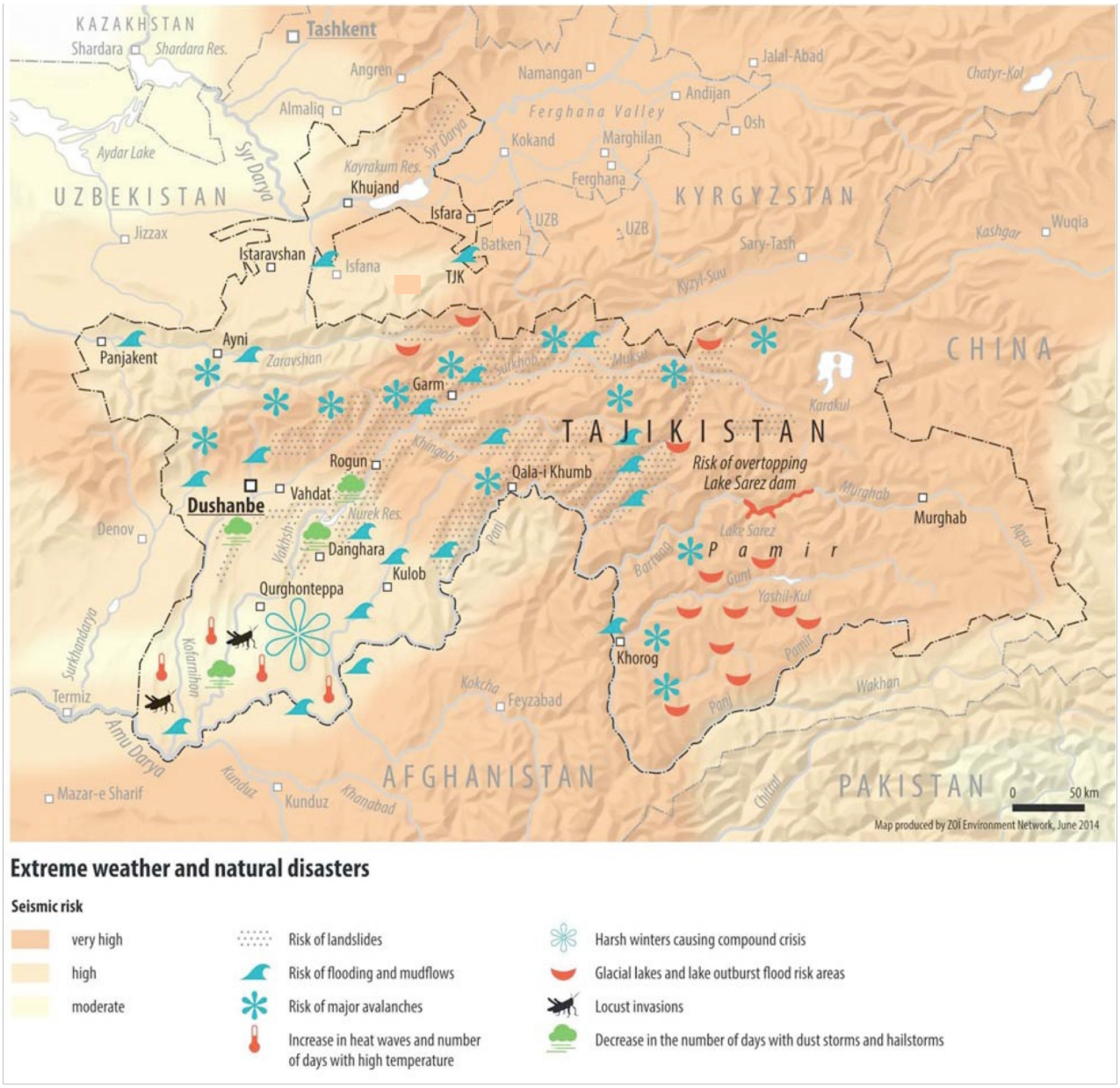
Source: Adapted from the TNC 2014

Figure 5: Average annual precipitation for 1941-2010



Source: Adapted from the TNC 2014

Figure 6: Extreme weather events and natural disasters



Source: Adapted from TNC 2014

The increase of temperature along with irregular precipitation patterns will continue in future. Climate change scenarios for Tajikistan show that significant raise of annual temperature will be evident in all regions of the country. Summer and winter temperatures will be highly prominent in Pamir and Hindukush mountains rather than in plain areas. By the end of XXI century, the temperature is likely increase by 5°C along the Southern Tajikistan, central mountains and western Pamir (TNC 2014). The risk of drought will increase due to an increase in total evaporation and earlier snowmelt. So for example in the densely populated Fergana valley the amount of precipitation is predicted to increase by +10 mm per year, but evaporation will increase abnormally by +70 mm by the middle of 21st century (TNC 2014).

It is evident that the increase in air temperature and insufficient winter precipitation (snow), especially in the mountainous glacier zone, may change river flow regimes. This, coupled with insufficient precipitation in spring, will negatively affect water, energy and food security (TNC 2014).

Extreme weather events

It is known that extreme weather events (EWE), which are mostly associated with hydrometeorological phenomena (drought, heavy rains, thunderstorms, hail, and dust storms), significantly hamper the economic development and pose a risk to human health and security. In Tajikistan, intensity and hazards of EWEs can differentiate along the regions. For example, the adverse impact of heavy rains, dust storms and thunderstorms is higher in mountainous areas than in plain

areas, while the latter is mostly known for the intensity of droughts.

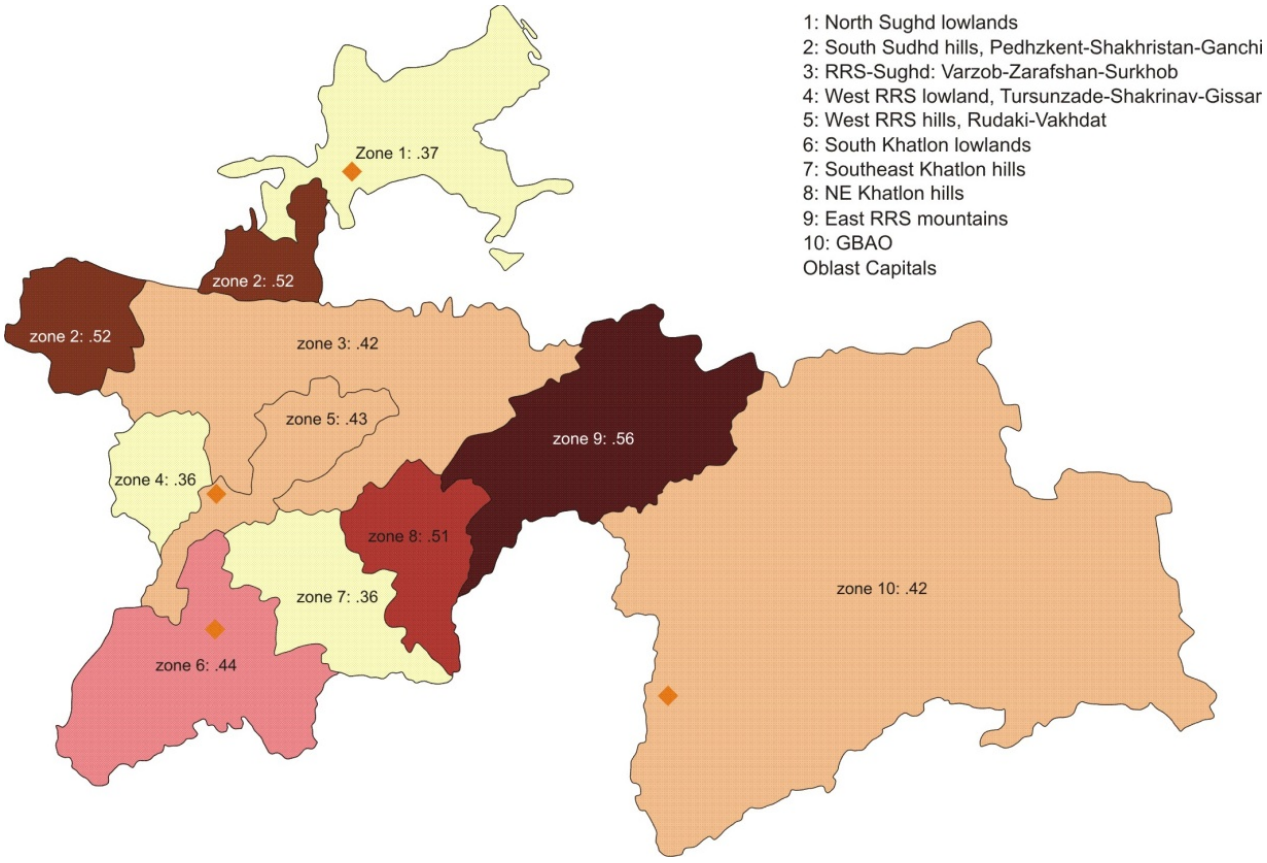
It is known that Tajikistan due to its geographic and topographic location is prone to water-induced disasters. Assessments indicate that around 85% of the country's territory is threatened by mudflows and floods (UN OCHA 2012). In the past years, consequences of EWE (heavy rains) in a form of floods have been observed in the river basins of Pyanj, Vakhsh, Kafirnighan (Southern Tajikistan), and Zeravshan (Northern Tajikistan). Aridity and drought have also become common in Tajikistan: in the past 60 years, the country has suffered eight major droughts, particularly impacting southern parts of the area. The forecasts show that the risk of droughts in light of climate change will be increasing: both in intensity rate and frequency. This will be caused by rapid evaporation and early snow melting. For example, in the Ferghana Valley, by the end of 21st century, the annual amount of precipitation will most probably increase by +10 mm per year. Nevertheless, the speed of evaporation will also increase and will amount to +70 mm (NTC 2014). Besides climate impacts, which pose a serious risk to land use management, a human factor also plays a critical role, especially due to overgrazing, outdated irrigation techniques and unsustainable land use practices. Hence, the rain-fed agriculture and pastures are the most vulnerable areas.

The expert assessments show that climate warming in the next 50 years will most likely cause global climate catastrophes. In Tajikistan, this risk is extremely high due to aridity of the region. It is expected that in the following decades, intensity and frequency of droughts will increase, while desertification and arid zones along the country will expand.

Vulnerability to climate risks

Various assessment reports show that the **most vulnerable** sub-regions within Tajikistan are those located in **central mountain parts** of the country (UNDP 2012a). The main reason for this particular location is not only associated with adverse impacts of climate change but mostly with weak capacity of the population to cope with climate risks, low quality of life and insufficient income. On the other hand, **southern parts** of the mountain and plain areas (Khatlon oblast) and **northern slopes** of Zeravshan and Turkestan range (Sogd oblast) are second in a row of climate vulnerability map. These findings compliment the observations and assessments of the national experts and local communities. See the detailed table, reflecting the vulnerability of environmental ecosystems to climate change in Annex 2.

Figure 7: Vulnerability zones in Tajikistan



Source: Adapted from UNDP 2012a

Box 3: Climate risks in central and western Tajikistan: community-based study

The mapping analysis was performed by the team of experts and was specifically focused on pilot sites within the UNDP project on Climate Risk Management. The main objective of the project is to increase resilience of rural mountain communities through agro-forestry and climate related disaster management. The key objective of the exercise is to map out climate risks and vulnerabilities at the community-based level [8 villages within four pilot jamoats] and propose a set of adaptation measures to mitigate risks and increase resilience[1].

Pilot sites of the mapping exercise have been selected within the pilot project sites and focused on: (1) **Central Tajikistan:** Vakhdat: Romit jamoat [villages: Yavroz, Poyonob] and (2) **Western Tajikistan:** (i) Hissar: Khanakoi Kuhi jamoat [villages: Istoni, Taht], (ii) Shahrinav: Sabo jamoat [villages: Bahtoobod, Sangijob] and (iii) Tursunzade: Rabot jamoat [villages: Kipchok, Olimobod].

Main findings of the exercise revealed that all villages face the same climate risks as increase of air temperature, heavy rains, droughts and frosts. Main challenges associated with the risks in foothill areas are water scarcity, decrease of harvest and risks to human health. In mountain areas, the key climate risks are mudflows and floods, rock falls and heavy rain falls. Meanwhile, major threats associated with these risks are soil erosion and pasture degradation, destruction of the infrastructure, and decrease of crop harvest.

The findings of the assessment show that the most vulnerable villages out of all 8 are: Olimobod village, Takht village and Sangichob village. The main interventions that have been suggested as strengthening the resilience of the villages, included improvements in (i) Infrastructure; (ii) Technology transfer and innovative solutions, primarily in agriculture; (iii) Protection of ecosystems and reforestation; (iv) Human health and (v) Capacity building, education and awareness raising. These findings closely connect adaptation measures and development, and can be a basis for formulation and enhancement of key strategic development policies, especially in the times of climate change, when the risks should be included into national sector-based development programs and plans of actions.

Skochilov et al. 2013

[1] More details about this mapping exercise can be found at the UNDP Energy and Environment Programme

Impacts of climate change on socio-economic sectors

In Central Asian region, Tajikistan remains one of the countries, dramatically exposed to climate-induced disasters, which have a sound affect on economic development. Tajikistan faces around 500 of natural disasters every year, which results in USD 100 million in losses and damages annually. Natural disasters have been accountable for 5% of the country's GDP during 1999-2008 (GoT 2009). The proportion of the population affected by climate-related disasters is the second largest out of the 28 countries (World Bank 2009).

During the period 1997-2009, natural disasters caused the loss of 933 lives and damages up to 1.15 billion Tajik Somoni, while floods of 1998-1999 led to death cases, and damages to agriculture and infrastructure amounting to 55 million USD. The severe drought in 2000 in Tajikistan affected 3 million people (half of the country's population at that time), risking the food security and development (World Bank 2013). Rapid increase of air temperature along with intensive snow and glacier melting in the mountains triggers flash floods and mudflows. In 2005 and 2010 they were the main cause of the infrastructure and agricultural damages up to 50-100 million USD (TNC 2014). "Compound crisis", which occurred in 2007-2008, resulted in economic loss of 250 million USD or around 7% of Tajikistan's GDP in 2007 (UNDP CRM 2010).

Water resources

Water resources are critical for the economic development of Tajikistan, especially for agriculture and energy. Any changes in runoff fluctuations may significantly threaten both sectors and have adverse consequences for the energy and food security, poverty and human health (Kayumov and Salimov 2013). On the other hand, the risk of natural disasters, which are becoming more frequent and severe due to climate change, are considered as crosscutting and challenge all sectors of socio-economic development and natural ecosystems.

It is known that the glaciers and snowfields of Tajikistan are the main water towers for the whole region in Central Asia, being critical for economic development of downstream countries. Glaciers within Tajikistan contribute 10-20% (and up to 70% during the dry season) to the runoff of all major rivers in the region, which is between 40-60% of all water resources in Central Asia (UNDP CRM 2010). Hence, any changes in the mountain environment and glacier fluctuations can cause stress to water runoff and affect the hydrologic regimes of the main rivers. According to the expert assessment (2003-2013), the melting of glaciers in Tajikistan due to increase of air temperature is a continuous process. While in the past decades the total glacial area was recorded as 6% out of total country's territory, by 2013, this estimate equaled to around 5% (TNC 2014; Kayumov 2013). Undoubtedly, this leads to changes in water availability and runoff. For example, the river runoff for the Aral Sea basin, which is formed in Tajikistan, nowadays is 53 cubic kilometers that is 4 cubic kilometers less than it was fifty years before.

The tendency of glacier melting and retreat in light of climate change in Tajikistan will continue. If global climate warming continues, the temperature might increase from -0.7°C to 1.4-3.0°C in the Pyanj river basin and reduce the glacial volume by 50-70%. This will definitely shift the peak of the river runoff in summer from July to May and June respectively (TNC 2014).

Energy and infrastructure

In Tajikistan, infrastructure that considered as most vulnerable to climate variability and change are transport roads, irrigation and hydropower generation facilities (SPCR 2010). Climate-induced disasters, such as flash floods and heavy rains are among key risks that damage infrastructure and reduce its capacity. For example, more than 500 km of road is prone to the risk of natural disasters every year (FNC 2002). During 1997-2001, due to extreme weather events, about 3.6 thousand km of roads and 500 bridges have been destroyed and damaged (FNC 2002).

Climate induced disasters, particularly floods and landslides, which are triggered by increase in temperature, heavy rains and rapid snow melting, are already blamed for a low efficiency of the dams operation and energy security challenges. Climate risk impacts are associated with rapid siltation of the hydropower dams, severe damages to infrastructure and hydropower stations and unpredictable fluctuations of the river runoff and hydrological regimes and its impacts on energy production.

The risk of siltation of the hydropower dams due to floods and sediments is particularly high. For example, an average speed of siltation in Nurek dam is from 6 m (initial part of the reservoir) to 2.5 m (at the dam). Over the past 45 years, the siltation of the Nurek reservoir most probably reached more than 100 m or 45% of the total height of the dam [dead volume]. According to the experts' estimates, the speed of the siltation is turned to be higher than initially expected (Sirojiddinov 2012). On the other hand, an increase of atmospheric precipitation by 10% in mountainous areas, which are extremely prone to water erosion, can double the volume of the sediments into the Vakhsh river, and thereby accelerate the speed of siltation (Oprunenko et al. 2010).

Climate-induced natural disasters also adversely affect sustainability and efficient performance of hydropower facilities. For example, in May 1993, heavy rains significantly damaged supporting tunnels and jumper reservoir of the Rogun dam, which was under construction until 1991, when the

"The proportion of the population affected by natural disasters is the second largest out of the 28 countries worldwide."

collapse of the Soviet Union and civil war ceased the works (World Bank 2014b). On the other hand, in 2002 a landslide was a cause of a severe deterioration of the Baipazinskaya hydropower dam.

Scenarios of climate change show that the energy sector will continue to be vulnerable to climate risks, especially in terms of air temperature increase and fluctuations in atmospheric precipitations, which in combination with extreme weather events, will most likely hamper the energy production in Tajikistan. For example, all models indicate the increase of river runoff in case of "warm and humid" climate; while for the "hot and dry" case scenarios of river runoff are quite different. Hydropower dams, which are critically dependent on river runoff and fluctuations in temperature and precipitation, are those located along Syr-Darya river (Kayrakkum HPP) and Vakhsh river (Nurek HPP) (TNC 2014).

Agriculture

Climate risks undoubtedly have adverse affects on agricultural sector. Floods and mudflows, caused by heavy rains, damage and wash out crop yields and decrease productivity. Yet, droughts are considered among the highest devastating climate change phenomena, which dramatically impact the agricultural development (UNDP 2012a). For example, the drought of 2001-2002 caused a critical drop in crop yields by 30-40% (Oxfam 2009; SNC 2008) in most dry farming areas. The drought of 2008, which was followed by a compound crisis, led to the decline of agricultural crops by 40% (IWPR 2008). Undoubtedly, extreme weather events that provoke floods and droughts do not stand alone. They are usually accompanied by other physical and human factors, which include the lack of adaptive capacity to cope with challenges, unsustainable irrigation and planting techniques, lack of fertilizers and climate resistant seeds. These also lead to a decline in agricultural production within the country.

Expert assessments show that the high air temperatures in combination with droughts diminish the vegetation process of the crops. The most vulnerable to climate risks are pastures and rain-fed agricultural lands. However, climate risks in the face of floods and droughts on agriculture are not stand-alone challenges. They are followed by the lack of water resources for irrigation and potential risks for tensions among the population for water discharge, pest outbreak and quality of crops and productivity rate. These in turn challenge the national food security and stimulate the increase of market prices.

Markets and value chains

Cotton is the main national product, which goes for export (as well as aluminum) and accounts for approximately two-thirds of the gross production value in the agriculture sector (UNDP CRM 2010). Climate change is likely to cause market changes if the deviation in cotton production occurs. Water is the major factor for cotton production. During vegetation period, one cotton plant requires about 1 cubic meter of water. Insufficient water supply causes slow growth of the plant, reduction of bolls and their early opening. The general water needs for cotton is 8-10 thousand cubic meters/ha in the vegetation period (FNC 2002). Considering that the most land area for cotton yields in Tajikistan is irrigated, the expected decrease in water runoff will significantly affect cotton production (SNC 2008). The latter will also be challenged by temperature warming and increased risk of pests. For example, an outbreak of cotton worm, especially in the southern parts of Tajikistan, will likely decrease the cotton harvest by 50% (SNC 2008). The cotton production may challenge not only external market and exports but impact internal value chains and affect textile and carpet production.

On the other hand, reliable power supply is also integral part of the value chain. In light of climate change, expected water deficit will significantly impact hydropower production. For example, in Sughd province, where most of Tajikistan's light industry is located (e.g. processing cotton and other agricultural produce), an estimated one-third of enterprises are unable to operate normally because of the unreliable power supply (SPCR 2010).

In Tajikistan, a further constraint to cotton and agricultural production system is the underdevelopment of the private sector. Whilst in other countries farmers and agro-processing enterprises have invested to upgrade practices, in Tajikistan the private sector lacks the knowledge, means and incentives. In the case of independent small farmers, institutional and input market obstacles are exacerbated by weak access to information on modern practices that limit their ability to innovate or expand into new products. On the other hand, there are many small farmers in Tajikistan who are part of supply chains organized by agribusinesses that provide farmers inputs, advice on practices and sometimes also financing (SPCR 2010).

Health and human security

Increased risk of natural disasters, especially in light of flash floods and mudflows seriously affect human health and security. In 2005, catastrophic flood, which was triggered by intense precipitation and abrupt increase of temperature, seriously destroyed and washed out a number of villages in Hamadoni district (south-east of Khatlon oblast). The flood in Kulyab (South Tajikistan) in 2010 was even more devastating. Accompanied by

mudflows, rocks and debris, it killed more than 40 people with 300 people to be injured and hospitalized. In fact, this flood was the highest in number of human casualties over the past decade. The death toll of this single disaster exceeded the overall deaths cases caused by any disaster in any year since 2000 (Majidov 2010).

Besides death and injury cases, a risk to food security and health increases during and aftermath of disasters. The loss of agricultural crops and livestock challenges food security, whilst limited access to safe drinking water and sanitation during the floods and mudflows simulates the drive of water-borne diseases. For example, in 2010 during the flood catastrophe, the capacity of the Kulyab water treatment system dropped to 30%. The people were temporarily settled in tents in the large sport stadium, which did not have favourable living conditions with basic sanitary services and hygiene. Hence, a risk of infectious diseases increased (TNC 2014).

Tajikistan is the country with an increased risk of water-borne diseases, especially due to unsatisfied conditions of the water treatment systems and canalization in rural areas, where most (65%) of people live. Instead, local population usually use water from the streams and canals, which unable to provide clean drinking water. The most vulnerable group of people susceptible to diseases are children up to 14 years old. They are accountable for more than 80% of all diarrhea cases (TNC 2014). The favourable environment for reproduction of microorganisms and bacteria responsible for water-borne diseases are likely to expand with the increase of air and water temperature, especially in stagnant ponds and open reservoirs. This in combination with the current state of water treatment system and disaster risk will definitely increase human and health insecurity.

Growth in air temperature aggravates the risk of malaria, infectious diseases, heat waves and stress, high blood pressure and respiratory diseases. Even though, malaria ceased to be a mass epidemic in Tajikistan since 1980s, climate warming and poor healthcare system coupled with the risk of transboundary malaria cases from neighbouring countries – primarily from Afghanistan and Kyrgyzstan – may provoke the increase of malaria. The similar situation was observed in 1992-2002, when more 400 thousand of people were at risk of malaria given the rapid increase in air temperature and growing stagnation of ponds and river banks (NAP 2003).

Green market.
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"Outdated agricultural practices and poor land management along with overuse of forests for fuel are the main reasons of the land degradation."

3.2 Climate risks and development

Natural Capital

Tajikistan's natural capital is mostly concentrated around water, land and forests. Tajikistan is one of the richest countries of the world on water resources. It forms 64 billion cubic meters of water annually, accounting for more than 60% of river flow in the Aral Sea basin. Only about 10% of river flow emerging in the country is used for domestic needs, and the rest of the water flows into the downstream countries, which is mainly used for land irrigation purposes (UNDP 2012c).

Tajikistan has one of the world's largest hydropower potential. At present, hydropower provides 98 percent of the country's energy demand, resulting in Tajikistan's considerable low carbon footprint[7]. Energy access throughout the country varies and is especially low and unreliable in mountainous regions, which cover over 70 percent of the territory. Despite of abundant water resources, more than 40% of population in Tajikistan has no access to safe drinking water, and in many rural areas the provision of drinking water remains an acute problem.

Shortages of electricity cause irregular pumping of water and lead to the poor quality of drinking water in many urban and rural areas. Irregular water pumping leads to the stagnation of water in reservoirs, causing deterioration of its quality. It is estimated that in order to reduce by half the number of people who lack access to safe drinking water, the country will need about 1 billion USD by 2015 (UNDP 2012c). Electricity also provides water to irrigate agricultural fields. Thus the lack of energy as well as the increased instability of the energy supply translate into shortages of irrigation water, and thus directly cause a decline in economic activity and incomes.

Climate models predict significant changes in the dynamics of glaciers and snowmelt, and precipitation with the climate warming over the coming decades. The impacts of climate change on hydrology need to be taken into account in the design, rehabilitation, and management of hydropower facilities to ensure that they are able to cope with more frequent extreme events, such as floods and mudslides, and continue to generate electricity safely, efficiently, and reliably under a range of projected climate change scenarios (World Bank 2013).

The state of environment in Tajikistan is depressing. In 2006, the cost of environmental degradation was estimated at almost 10 percent of the country's GDP, with the land degradation contributing to 3.8 percent of GDP (Olcott 2012). Agricultural land in Tajikistan amounts to just over 5% of its territory, with large parts affected by erosion and salinization, which are already irreversible. It is estimated that the quality of 97% of the arable land has severely declined over the past 15 years. Outdated agricultural practices and poor land management along with overuse of forests for fuel are the main reasons of the land degradation. The conditions are worse in mountain regions: soil erosion of rain-fed farmlands, degradation of pastures, degradation of forests and bushes, with a subsequent loss of biodiversity; irrigation related degradation and degradation due to natural disasters (mudflows and floods). In most aspects, the land degradation is similar to other countries of Central Asia but more acute in Tajikistan (Table 2).

[7] Yet, there are concerns of terming it "clean". No or limited access to energy resources forces the rural population to cut trees, which is the natural sink for CO2 emissions

Table 2: Erosion in Central Asia

Country	Type of erosion	1990-1999		2000-2005	
		Mln ha	% of total area	Mln ha	% of total area
Kazakhstan	Water	1.44	0.52	1.05	0.38
	Wind	1.47	0.53	0.6	0.22
Kyrgyzstan	Wind, water and pasturable erosion	5.4	27	5.7	28.5
Uzbekistan	Water	n.a.	n.a.	0.135	3.14
	Wind	n.a.	n.a.	0.365	8.48
Tajikistan	Water	8.3	58	10.3	72
	Wind	3.7	26	3.7	26

Source: Adapted from Olcott 2012

It is expected that in light of climate change the irrigated agriculture will be threatened at most. The reduced water runoff is expected to put a dramatic stress on Tajikistan's land resources. The crop yields in some regions of the country will fall by 30 percent by 2100, causing changes in crop and forage quality, and the spread of pests and diseases (World Bank 2013). Coupled with other barriers, such as lack of finance, technical capacities and obsolete infrastructure, climate change will seriously challenge the food security and sustainable economic development.

It is known that irrigated agriculture totally depends on water availability, which will experience a substantial deficit in a long-term future. The estimates show that in the next 20 years, the flow of main rivers such as Amudarya and Syrdarya will be most likely reduced by 20-30%, being a cause of economic decline of the whole Central Asian region (IPCC 2007).

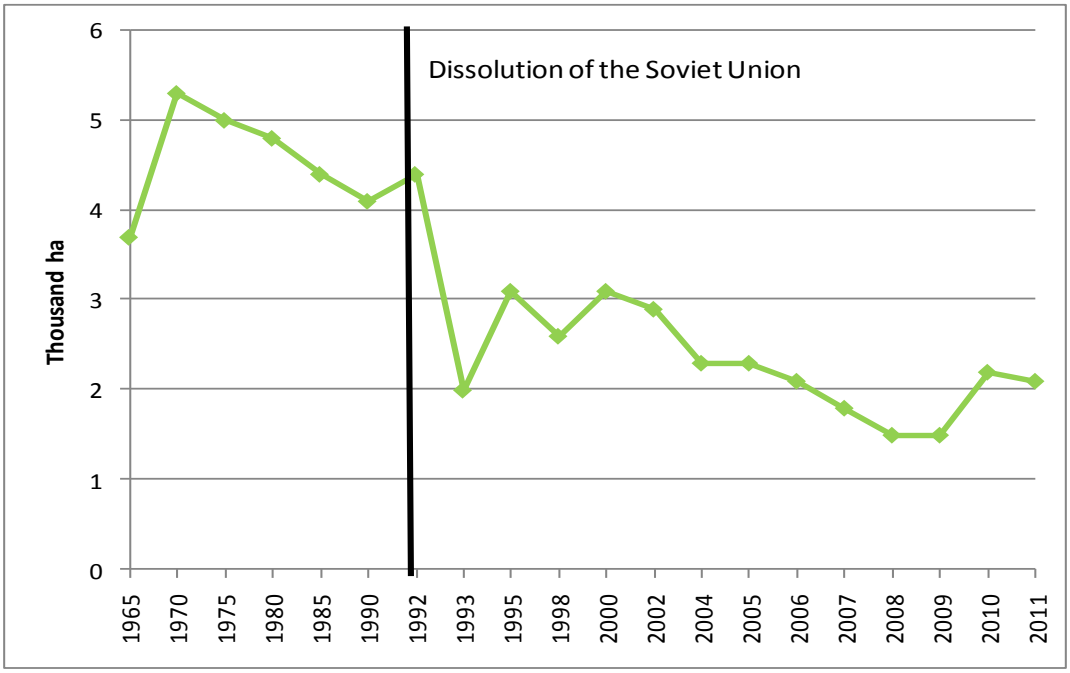
Forests in Tajikistan perform mainly water conservation-, soil erosion control-, agricultural, fuel wood- and recreational functions. The official statistics on the forest area indicate that some 3% of the country's territory is still covered with forests, and almost all of them are severely degraded (SNC 2008). The direct costs of deforestation include losses for non-timber products, fuel wood, tourism and recreation, with the indirect costs for the loss of watershed protection. Since independence, forest areas were reduced by 27%. In 2006 the World Bank estimated that the total cost of deforestation was 0.2 percent of GDP (Olcott 2012). Table 4 indicates the dynamics of the size of perennial plants. Main causes of deforestation in Tajikistan are anthropogenic and include: (i) Illegal logging of trees and shrubs primarily for use as fuel wood and timber; (ii) Transfer of forestry areas for agricultural use with further felling of trees and shrubs; (iii) Illegal seizure of leskhoz land; and (iv) Unsustainable management practices including excessive cattle grazing.

Table 3: Size of perennial plants by type

Type	2004	2005	2006	2007	2008	2009	2010	2011
Forests, ha	296347	295867	292424	292118	291979	292306	294449	291548
Shrubs, ha	252420	267805	271784	272103	271051	272346	269981	273601
Other perennial plants, ha	102628	101136	103136	105571	105104	109671	120662	126417
Total, ha	651395	665307	667344	669792	668134	674323	685092	691566

Source: SNC 2008

Figure 8: Area afforested/reforested yearly from 1965-2011



Source: SNC 2008

Afforestation- and reforestation (A/R) activities have declined since independence due to the lack of sustainable financing. Graph 5 presents the dynamics of such activities since independence. Key risk factors that could lead to further deforestation and forest degradation are associated with a deficit in energy supply and thus high demand for fuel wood, widespread rural poverty and inadequate capacity of the leskhozes.

Human Capital

Human capital is a combination of knowledge, skills, education and capacity of the nation and its ability to drive the socio-economic development and strengthen the resilience. Human capital is closely interlinked with the human development indicators (HDI). In Tajikistan, as it was highlighted in previous chapters, the HDI is the lowest, compared to other countries of Central Asia and Europe. The lower HDI, the less capable is the nation to cope with risks.

The main findings of the UNDP (2012) capacity assessment showed that despite of multiple climate interventions and projects having place in Tajikistan over the past years, the lack of capacity (systemic, organizational and individual) remains a serious shortcoming to respond and adapt to climate impacts. More than 90% of respondents from the national and sub-regional (oblast) governmental institutions highlighted the lack of qualified personnel, limited institutional memory and brain drain as gaps, and admitted that they need to receive additional information and knowledge on climate change.

While assessing Tajikistan's human capital and its role in sustainable economic development, as well as in adaptation and resilience to climate risks, it is important to admit such major factors, affecting the human capital as the civil war (during the 1990s), poverty and migration, which dramatically undermine the growth of human capital. On the other hand, vulnerable groups and social inequality seriously limit the generation of new knowledge and skills.

Although the education system was significantly improved since the civil war's end in 1997, the challenges are mostly associated with the quality of education and lack of professional teaching staff (primary, secondary and high schools/university). This is explained by the highest emigration and refugee rate during the civil war among the Russian-speaking people (mostly ethnic Russians and Tatars) from Tajikistan, who comprised the critical mass of school teachers and university professors. Although since 1997 the Government of Tajikistan has expressed a desire for the Russian population to stay, the latter continued to leave. It is estimated that 75% of the Russian-speaking population decreased since 1989 in the result of emigration; moreover, Russians now make up less than 1 percent of the Tajik population compared with 7.6 percent in 1989 (Erlich 2006; Statistic Agency 2015).

The civil war and decline in education in 1990s resulted in a

formation of the so-called "lost generation" in Tajikistan. This is primarily attributed to the age group between 19 and 22 years old, who have missed their education in times of austerity, and nowadays face the problems like labour migration and unemployment. The phenomenon of "lost generation" is becoming a threat for much younger age group at present. Majority of Tajik families, while migrating to Russia for a seasonal job, leave their children with the grandparents. This not only creates a gap between the parents and children, but also ceases the transfer of knowledge from one generation to another.

It is recognized that migration is critical for Tajikistan. More than 700,000 of Tajik migrants are out of the country. Russia accommodates more than 90% of local migrants (Statistic Agency 2015; Jones et al. 2007). World Bank ranked Tajikistan as the most remittances' dependent country in the world, with remittances making almost half of Tajikistan's GDP. In addition to positive impacts on income generation and improved life quality, labour migration has a number of negative effects. These include:

- Increasing number of abandoned women and children: Observations show that there is a growing tendency of a negative social and economic impact of labour migration to migrants' families left behind. Majority of the Tajik men going to Russian do not come back to their families. In 2012 there were 12,000 marriages of Tajik men with local women registered in Russia (Boboeva 2013). Abandoned women, who are left behind, live in extreme poverty and inadequate housing facilities, eating the food which they cultivated themselves and occasionally get help from their relatives. On the other hand, children, who have left behind, often lack parental guidance and suffer depression and aggressiveness.
- Loss of human capital and professional qualification: It is known that most of Tajik migrants are usually employed in unskilled labour (cleaning, manual work, etc.) with a relatively little payment. The main reason is the weak education and capacity of migrants to work in other areas of expertise. The biggest share of migrants usually comes from the villages, where the access to proper primary and high-school education is poor. Coupled with the weak level of primary knowledge, Tajik migrants have limited ability of speaking in Russian, which is crucial for working in the receiving country. On the other hand, there are cases, when the Tajik migrants possess university degrees and have a solid educational and professional background (teachers, engineers, etc.), but due to tiny wages in their home countries and a need to feed up the family, they have to work as in most demanding sector, like construction and services, in receiving country.
- Health and social security: The working conditions and rights of the large number of Tajik workers abroad remain a serious concern with no proper access to healthcare facilities and health insurance. Only 13 percent of the Tajik workers abroad had any health insurance, and 8.5 percent were paid sick leave in 2009 (UN 2014). The risk of transmission diseases from labour migrants to Tajikistan is also growing. For example, the National Tuberculosis Program documented in 2013 that out of 5,183 new patients, 897 cases were registered in persons with labour migration history (17.3%). In 2011 and 2012, this proportion was 13.5% and 16.8% respectively. On the other hand, illegal migration causes the issues with pensions, insurances and social remuneration. In 2013, the number of Tajik migrants at pension age abroad is around 10 thousand people (National Statistics 2014), which poses a risk to their social security upon arrival.
- Life safety and security: Working illegally often leads to the employment of migrants for dangerous and unsafe jobs, which can be harmful not only for their health state but life security. There were a number of cases, when illegally employed migrants experienced abuse from the side of police, criminals and other minorities, like skin-heads. Furthermore, once in abusive situations, lack of papers and legal documents, limited awareness about their rights and fear of arrest or deportation often prevent Tajik migrants from seeking help from the authorities.
- Stigma and discrimination: Tajik migrants in destination countries face exploitation, and violation of their rights due to stigma and discrimination. Most of the migrants are assumed to be drug dealers and criminals.

However, external migration and its impacts on socio-economic development should not be seen in isolation. Increased risks of climate change and its impact on agriculture coupled with the limited human capacities and skills are becoming more prominent over the past years in rural areas of Tajikistan. There are a number of cases when farmers received bank credits for cultivation of agricultural crops (cotton, rice, wheat, etc.)[8]. However, climate and weather

[8] The money is usually required for buying seeds, fertilizers, use of machineries and salaries, etc.

conditions turned to be unfavorable, and people lost the harvest. Hence, in order to pay back, they have to seek for seasonal jobs abroad.

Weak human capital and limited coping capacities coupled with climate risks and poverty intensify vulnerability of the rural population at most. For now, vulnerable groups in Tajikistan are considered the people, who are extremely poor and live beyond the poverty line. However, in light of climate change, there is a need to move beyond only the poor and take into account other vulnerable groups, such as the elderly, women, people with chronic health conditions, children, disabled people, indigenous peoples, people dependent on natural resources (e.g. pastoralists), and migrants.

Human capital is one of the key prerequisites of the country's coping capacities to respond to climate change. Therefore, in order to increase its growth, one has to take into account multiple factors, including those associated with the quality of education, migration and its by-side effects, vulnerable groups and capacity building.

A man at an apple tree.
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4. Implications for adaptation policy

4.1 Assessment of national policies and institutions

International commitments and positioning on climate change

The Republic of Tajikistan ratified the UN Framework Convention on Climate Change (UNFCCC) in 1998, being as the non-Annex 1 Party. In 2008, the country signed and ratified the Kyoto Protocol, as the non-Annex B Party. In order to meet the commitments under the UNFCCC, Tajikistan has prepared three National Communications (2002, 2008, and 2014 accordingly) on climate change that included national greenhouse gas inventory reports, as well as developed and approved the National Action Plan (NAP) for climate change mitigation (2003). However, the "shelf life" of this policy document requires the development of new strategy or plan, which will be able to identify priorities of the country, list adaptation measures and delegate responsibilities over the key ministries and departments. This is the priority which is currently driven by the Government of Tajikistan through its Committee for environmental protection and State Administration for Hydrometeorology, who are in process of developing of the National Strategy for climate change adaptation. The initiative is supported by the PPCR. It is expected that the Strategy will be completed by 2015.

Tajikistan is assured that all countries worldwide should commit themselves to reduce greenhouse gas emissions in accordance with their carbon footprint, socio-economic development, available finance and technologies. The country, being the most vulnerable to climate risks and possessing huge glacial and snow reserves critical for river runoff formation, is assured that international community should focus on climate change mitigation and adaptation. Importance of minimizing the pressure of climate change impacts on glaciers and water resources is on top of political agenda and regularly highlighted at high-level symposiums and forums on climate change and sustainable development.

Tajikistan's inputs to climate change mitigation is seen in moving towards "green" economy through the lenses of rational use of natural resources, low-carbon development and acceleration of investments to new technologies on renewable energy and energy efficiency. This position is backed up with relevant programs on environment management and climate change, reforms in laws and legal acts as well as initiatives and projects on cross sector areas, such as energy, transport, agriculture, and forest management.

At the eve of the new global commitments, which are about to be discussed at the 21st meeting of the UNFCCC Conference of the Parties in Paris in 2015, Tajikistan intends to contribute to the global policy on greenhouse gas emission reduction and climate change mitigation and adaptation. The key areas, where the Government sees its potential inputs for GHG reduction and carbon sequestration is to accelerate the deployment of renewable energy sources, mostly through the use of untapped capacity of hydropower (small and medium HPP construction) and increase reforestation and afforestation measures. The latter activities for example, are broadly reflected in the National Program on carbon sequestration through afforestation and reforestation in Tajikistan, using NAMA (Nationally Appropriate Mitigation Measures) instrument, which was approved by the Government of the Republic of Tajikistan in 2014. The Program envisages the reduction of GHG emissions by increasing the carbon sequestration capacities of the forestry sector through afforestation and reforestation activities. Duration of the Program is 10 years, covering the period of 2014-2024. The estimates show that the total amount of carbon sequestration will comprise -2638.7 thousand ton of CO_2 by 2034. At present, the efforts are put to explore funding opportunities for the Program both at the governmental and international level.

National policies and programs on environmental protection and climate change

The Government of Tajikistan recognizes the importance of environmental protection and assures the relevant legislative and political platform. By now it adopted more than 30 laws and bylaws in the area of nature protection, developed more than 10 national environmental programmes and national action plans (Annex 3).

The key strategic document, which speaks about climate change policy in Tajikistan, is the National Action Plan (NAP) of the Republic of Tajikistan for climate change mitigation (approved in 2003). Its implementation was successful due to joint efforts of the donor and international communities, civil

Box 4: Participation in global climate change initiatives

The issue of climate change and its impact on glacial melting and degradation are on top of the national policy agenda. The need to act in favour to glaciers' protection, which is critical for water runoff and socio-economic development of the whole Central Asian region, is regularly stressed by high-level officials at international summits and conferences on sustainable development and climate change. For example, in the frames of the Third World Climate Conference (Geneva, 2009) President Rahmon announced about the need to establish the International Fund for protecting glaciers and enhance monitoring, observation and research over glaciers and glacial lakes. Tajikistan actively participates in other international and regional events. For example, at side events of COP/MOP UNFCCC (2003, 2009, 2010 and 2013), Tajik experts and officials presented the findings of the National Communications on climate change and assessments of the PPCR (Pilot Program for Climate Resilience).

Tajikistan is also a part of other international and regional platforms. For example, in the frames of the International Fund for saving the Aral Sea (IFAS), key focus is attained to the problems of transboundary water and environmental management in Central Asia; within the climate change topic, program team and national experts performed studies and research on glaciers and their impacts on water resources and hydropower capacity. On the other hand, Tajikistan is also involved to other regional structures like Interstate Commission for Sustainable Development (ICSD)[1] and Interstate Commission for Water Coordination (ICWC), which also deal with climate change.

In the frames of the International Polar Year 2007-2008 (IPY), Tajikistan contributed to the research and studies on glaciers and ice cover of all polar areas worldwide. One of the main global tasks of the IPY research program was to assess global climate change impacts and provide a set of recommendations to move towards sustainable development. In IPY initiative more than 60 thousand scientists took part, including Tajikistan. The main output of the program was the establishment of the Global Cryosphere Watch (GCW) in 2011, where Tajikistan is also a member. Moreover, in the frames of the IPY, the first Tajik Antarctic Expedition was launched in 2008, while in 2011 as a follow-up action the First International Scientific Expedition was organized to study the state of glaciers and mountain environment in upstream of Vakhsh and Pyandj river basins (Pamir-Alai, Tajikistan) with participation of glaciologists from Russia and Central Asia.

[1] Tajikistan on behalf of its Committee for environmental protection under the Government of the Republic has been chairing the ICSD in 2013-2014.

civil society and private and state initiatives. Update of the NAP is expected in 2014-2015 in light of recent developments on climate change in Tajikistan, and commitments and progress under the UNFCCC.

Despite of all policy documents and national programs on environment management and sustainable development, lack of knowledge about climate change adaptation is a gap that is evident at many government agencies. Majority of the governmental officials perceive climate change as a strictly "ecological" issue. There's also a gap between familiarity by civil servants of their own agencies' mandates and the laws governing those mandates and climate change policies. Furthermore, a lack of analytical skills is also a gap; i.e., agencies collected data and reported on programs but were not able to analyze the data and use the findings to inform program design (Table 4).

Table 4: Gap analysis by capacity levels

National Level	Gap Analysis by Capacity Levels		
	Systemic	Organizational	Individual
National Development Policies	Climate change and adaptation are not mainstreamed into national development strategies	Reporting on climate-related issues in the NDS and the PRS is not consolidated; the adaptation-related "portfolio" is not seen as a whole	Decision-makers are unaware of adaptation issues or perceive adaptation as a strictly "ecological" issue rather than a development issue
Economic/Sectoral Development Policies	Laws in climate-sensitive sectors (agriculture, water, health) do not mention climate change and/or adaptation	Ministries and other agencies in climate-sensitive sectors do not have a legal mandate to conduct work on adaptation	Decision-makers are unaware of adaptation issues or perceive adaptation as a strictly "ecological" issue rather than a development issue
Environment Policies	Action Plan on Climate Change Mitigation lacks funding; no Action Plan addressing adaptation	Committee on Environmental Protection is a less powerful organization than other agencies Restructuring and shifts in program mandates can lead to low availability of program-related information Need to prepare compelling budget requests that explain the development linkages of environmental programs	Decision-makers and staff lack specialized knowledge to design and implement climate change adaptation programs
Public Admin/Public Management	Low government salaries make it difficult to attract and retain qualified staff Institutional reorganizations lead to lack of continuity; loss of data, reports, and institutional memory Climate change adaptation portfolio (and climate change more generally) is not treated as a whole for monitoring	Government agencies may report on program implementation but not necessarily incorporate lessons learned into program design Unclear alignment between agency budgeting and policy priorities.	Sectoral agencies may lack the skills to analyze the data they collect and utilize the findings from adaptation-related projects.
NGOs and NGO Networks	Lack of ongoing support for initiatives leads to continuity gaps	Organizations lack funding to maintain staff and facilities	Staff often lacks specialized training or mentoring; capacity development has focused on multiple introductory-level trainings from different donors.

Source: Adapted from UNDP 2012a

National institutions and capacities on climate change

Government of Tajikistan

In climate change adaptation, the Executive Office of the Deputy Prime Minister oversees the Pilot Program for Climate Resilience on behalf of the Republic of Tajikistan and has provided the program process with high-level government support. The government administration also houses the PPCR focal point, who is the Head of the Department of Environment and Emergency Situations. More generally, the administration plays an important role in enforcing laws related to environment and climate change, at all levels of state committee offices (e.g. forest administration, Hydromet, land use) are subject to Governmental decisions under the principle of double subordination. The administration must also approve all action plans, such as the Action Plan on Climate Change Adaptation that is under development.

State Administration for Hydrometeorology (Hydromet)

This agency, which is overseen by the Committee for environmental protection under the GoT is the governmental body that is responsible for dealing with climate change issues in the country, and its director is the National Focal Point of the UNFCCC. Hydromet also houses the **Climate Change and Ozone Centre**[9]**.** The Centre handles all aspects of climate-related research and reporting related to both mitigation and adaptation. In particular, the Centre is leading the development of the National Action Plan on Climate Change Adaptation and the National Strategy on Adaptation until 2030.

[9] The short title for the centre is the Climate Change Centre. The centre is also sometimes referred to as the Climate Change Study Centre.

Committee for Environmental Protection under the GoT (CEP)

The Committee coordinates activities on environmental protection among government agencies and is charged with overseeing government control over natural resource use, land protection, subsoil, forests, water, and other resources. Its decisions on environmental protection are considered to be mandatory for all legal entities and individuals. In the area of climate change, it oversees Hydromet.

CEP also has its own information centre, an Aarhus Centre, a training centre, and laboratory facilities. Current needs at CEP related to climate change adaptation include a need for increased involvement in policy-making for sectors that are vulnerable to climate threats, a clear mandate for coordination with other ministries in cross-cutting areas such as environmental education, and training on climate change adaptation and mainstreaming adaptation into policies and programs. Information about other key ministries and agencies and reflection of climate change in their mandates and scope of work dealing with development and climate change both directly and indirectly are found in Annex 4.

Yet, despite of the fact that the key ministries and departments understand climate change and its impacts in long-term perspective and even undertake measures to respond to risks (e.g. Committee for emergency situations), most of them do not have official mandates to act in favour to climate change adaptation. Institutional capacity of the institutions is also low. Specialists, who are working in the key ministries and departments, have a thematic understanding of the problem only (e.g. water, irrigation, agriculture, etc.) with no capacity of linking climate change with their thematic area of expertise. Exception is the State Administration for Hydrometeorology and its Climate Change Centre, which is the main governmental body dealing with climate change professionally. Yet, many projects and initiatives are still lacking high-profile experts, who have analytical skills on climate change. Below is the table highlighting gap by capacity levels between the thematic/sector-based area and perception of climate change.

Table 5: Sector-based gap analysis

Sector	Gap Analysis by Capacity Levels		
	Systemic	Organizational	Individual
Water Resources	Climate change and adaptation issues are not mainstreamed into water legislation Low dissemination of water-saving technologies in agriculture and other end-use sectors	Water User Associations lack information and training on climate change and adaptation issues, particularly adaptive behaviors Lack of staffing and funding to ensure potable water for all residents, particularly in remote areas	The general population lacks information on water-saving measures Farmers are unaware of less water-intensive farming practices
Agriculture	Climate change and adaptation issues are not mainstreamed into agricultural legislation Farm reform has created many decentralized, individual land owners who will require information about adaptive measures	Government officials overseeing farm reform lack information about climate change and adaptation	Farmers lack important information on effective practices in irrigation and crop and livestock protection In certain regions, farmers may not trust farming advice provided by non-family members
Energy	Energy laws and policies do not mainstream climate considerations Energy efficiency is underutilized as an energy resource	High-quality long-term climate models are not available for energy planners to utilize in the hydropower sector	Individuals are often unaware of ways to save energy or use renewable resources that are not dependent on water supply
Health	Lack of a mandate for health agencies to address climate change issues Lack of population-based screening to provide data on prevalence of chronic and infectious diseases Lack of early warning and response systems for extreme weather events that threaten human health (e.g. heat shocks or flooding)	Difficulties in retaining qualified staff in the regions Lack of funding for continuing medical education and for laboratories and training facilities	Health professionals may lack training to properly monitor and analyse morbidity and mortality data Individuals in certain regions are unused to temperature extremes and lack knowledge of how to protect themselves

Source: Adapted from UNDP 2012a

4.2 Challenges to climate resilience and development

Despite of the ongoing programs and initiatives on climate change adaptation and resilience in Tajikistan, there are still a number of challenges which hamper the progress. The challenges provided below have been identified as a result of a number of consultancies and meetings with key national counterparts, as well as derived from the discussions in the frames of the regional and national events on climate change.

National development policies and programs: It is evident that there is still limited legal basis on climate adaptation and development policies. The national development or poverty reduction strategies do not comprehensively consider climate change in their agendas. The planning of sector-based programs (e.g. forestry, agriculture, energy, etc.) does not envisage a close linkage between thematic activities and climate change. The only national policy that addresses climate change adaptation and mitigation in Tajikistan is the National Action Plan of the Republic of Tajikistan (NAP) on climate change mitigation (2003). However, adaptation plans on national level and the current need for adaptation on the local level are not always linked closely.

Finance resources: It is still obvious that implementation of programmes in support of policies is overwhelmingly dependent on external financing[10], while the national budgeting of governmental agencies, including line ministries and departments to implement them, is very weak.

Interagency coordination: There are a number of interventions running on climate change (country-wide, local or community-based) in Tajikistan. However, the lack of communication and coordination between the agencies creates a barrier towards planning and implementation of activities. For example, there are cases when the training institutions have been supported to develop curriculums on environmental protection but the lack of coordination with the agencies, dealing with climate change, often leaves the subject out of the content.

Technical capacity: Technical expertise on climate change mostly exists within a limited number of institutions in Tajikistan – mostly with Hydromet and Committee for environmental protection under the GoT. Yet, most of specialists possess either specific skills (meteorologists, hydrologists) or broader knowledge (environment, water management). At the same time, there is a lack of specialists, who possess analytical skills on climate change, within other agencies, both at the national and sub-regional (oblast) level.

Awareness and education: Most of the projects on climate change in the region include activities on raising awareness and education. Target groups may vary from policy makers to the community-based population. Yet, despite of many targeted awareness programs, there is still a lack of awareness and understanding of climate risks and their impact on development. Observations show that climate change is still foreseen as environmental challenge rather than an issue of development. It is perceived as a long-term problem, which is not yet visible. Therefore, people hardly believe in climate change that creates a barrier to their learning and education.

Research on climate change: TNC (2014) highlights that there's an increased need for extended research and studies on climate change. A special focus should be made to climate-sensitive sectors, like energy, water, agriculture and health. On the other hand, the findings of the research should be mainstreamed to the key development policies and poverty reduction strategy. Alongside, there is a need to address research needs and cultivate the next generation of climate researchers in Tajikistan. Such a strategy should acknowledge the changes in academia following the collapse of the Soviet Union.

4.3 Opportunities for research on climate resilience and development

In order to strengthen the climate-resilient development, echoing one of the specific challenges summarized in the above section, there are opportunities for research and studies in Tajikistan. The Pathways to Resilience in Semi-Arid Economies (PRISE) is a five-year, multi-country research project that generates new knowledge about how economic development in semi-arid regions can be made more equitable and resilient to climate change. PRISE aims to strengthen the commitment of decision-makers in local and national governments, businesses and trade bodies to rapid, inclusive and resilient development in these regions. It does so by deepening their understanding of the threats and opportunities that semi-arid economies face in relation to climate change.

PRISE research targets semi-arid areas across six countries in Africa and Asia: Burkina Faso, Senegal, Tanzania, Kenya, Pakistan and Tajikistan. The research is organised around five areas: (1) climate risk management, (2) governance, institutions and finance,

[10] Many state programmes, which nowadays exist in the country, mostly foresee the international financial support for successful implementation. However, international investments are not always designed for meeting the national priorities. As a result, the status of implementation of the state programmes due to the lack of funding is a typical problem (pers. observation).

(3) markets and supply chains, (4) natural capital and (5) human capital. Each area is led by a consortium partner and engages researchers from across the five consortium members to ensure a blend of cross-disciplinary expertise and methodological insights.

Key findings of the stakeholder engagement platform in Tajikistan

The inception phase of the project in Tajikistan envisaged the development of the country situation analysis report (CSA) with a particular emphasis on development and climate change, as well the establishment of the stakeholder engagement platform (SEP). The first meeting of the platform has taken place on the 2nd of December, while the second and final one was on the 20th of February 2015 in Dushanbe. The key findings of discussions are listed in Boxes 5 to 7.

Box 5: Top five research questions

- How the fluctuations in remittances from labor migration will challenge the socio-economic situation in Tajikistan, especially in light of current economic crisis in the receiving country (Russia)? What are the risks for natural and human capital?
- How will the market and supply chains for agricultural products change in light of climate change?
- What is the economic valuation of natural capital and what approaches should be used to eliminate a risk of "lost" benefits from the irrational use of the natural resources in Tajikistan?
- How climate change will influence the food security in different sub-regions of Tajikistan? (focus on the least developed sub-regions)
- How far should adaptation policies influence the socio-economic development of Tajikistan? (focus on the least developed sub-regions)

Box 6: Key messages from the stakeholder engagement platform

- To use existing studies and assessments, which are available in the country (PPCR, other projects);
- To prioritize the agricultural sector. For example, National Program on agricultural reform until 2020, can be a niche to compliment existing recommendations, i.e. on crop diversification and cultivation of drought-resistant varieties of crops.
- To close the gap between the national adaptation strategy and local adaptation needs; include gender specific aspects.
- To involve private sector to adaptation activities and assess their opportunities and risks in light of climate change.
- To pay more attention to health sector: e.g. studying the loss effect from the death cases (especially for those, associated with climate change: malaria, infectious diseases, heat waves, etc.) and its impact on human capital.

Box 7: Opportunities for potential engagement within PRISE

- To use a momentum for key development policies beyond 2015: National Development Strategy; Living Standards Improvement Strategy; National Strategy on CC Adaptation to integrate the research findings.
- To use the capacities of governmental, non-governmental and research institutes to conduct research at different levels
- To use the methods and approaches proved effective for other countries with similar national circumstances.
- To enhance the evidence base on climate change and development and improve the national (technical) capacity in research/studies.

Nevertheless we should also take into account other research questions, which have also been highlighted as important:

How the fluctuations in remittances from labor migration will challenge the socio-economic situation in Tajikistan, especially in light of current economic crisis in the receiving country (Russia)? What are the risks for natural and human capital?

- Note: It is known that the remittances from the labor migration in Tajikistan constitute the biggest share of the GDP. In 2013, they formed 49%.

What is the impact of climate risks for an internal migration of population, and how it will influence on social, cultural and psychological aspects?

- Note: Tajikistan is a disaster prone country. It is expected that climate change will aggravate the intensity and frequency of disasters (drought, floods, etc.) and increase the risk of resettlement and internal migration of population.

How can human capital increase the climate resilience?

- Note: One of the barriers towards an effective climate policy in Tajikistan is the lack of human capacity and capital. If we turn the question backward and state that increased human capital can improve climate resilience, what is the answer expected to be?

Will a risk of poverty increase, if proper adaptation measures to climate change impacts are not taken?

- Note: It is well known that weak adaptation capacity is very closely linked with poverty, with the latter to aggravate the vulnerability and sensibility to climate risks. What if adaptation measures are not taken; will it affect the poverty rate in Tajikistan?

How will the market and supply chains for agricultural products change in light of climate change?

- Note: It is known that agriculture is the most vulnerable sector to climate change and yet, the most contributive to socio-economic development in Tajikistan. The research question touches every stage of the supply chain for agricultural products: production, processing, packaging, transportation, storage and consumption.

How can a gap between the needs for community-based adaptation and priorities for adaptation programs at the national level be decreased?

- Note: It is obvious that the formulation of a climate policy usually undertakes a top-down approach, without or with little attention of the local communities and their needs for adaptation. How can we close the gap between the real needs for adaptation at the community-based level (locally) and priorities set in the adaptation programs (nationally)?

What is the economic valuation of natural capital and what approaches should be used to eliminate a risk of “lost” benefits from the irrational use of the natural resources in Tajikistan?

- Note: It is a known that natural capital can be economically valuated. However, this approach is relatively new in Tajikistan and should be explored to a greater/detailed extent. It would be useful to undertake a research on economic valuation of land and water resources (agriculture and hydropower generation sectors) primarily and introduce the findings to the main policy documents.

What is the difference between men and women in perceiving and responding to climate change?

- Note: There are a number of research and studies on climate change and gender. In Tajikistan, however, comprehensive study was not performed. At the same time, there are observations that women and men in Tajikistan perceive climate change differently. Either they act to respond to risks. It would be useful to have a disaggregated set of findings in this area of research, especially while developing and implementing local development plans.

What research methods and approaches on climate change proved to be effective both at the national and local levels?

- Note: There are a lot of well recognized international methods and approaches to perform the studies and research. However, most of them are not applicable to the national circumstances of this or that country. It would be useful to have an overview of methodologies and approaches to plan and undertake research and studies on different topics relevant to climate change (agriculture, hydropower, disaster risk management, capacity assessment, etc.).

How climate change will challenge food security in the mid- and long term period?

- Note: Agriculture is the main economic sector, which is responsible not only for 21% of country’s GDP and 64% of population employment but is recognized as a key driver of food security in Tajikistan. The research question is expected to get an answer on how and to what extent climate change will trigger changes in food sector?

How climate change and current situation with the livestock will

change the state of pastures and what measures should be applied to improve their quality?

- Note: The estimates show that the livestock has been increasing over the recent years in Tajikistan. Yet the size of pastures and a level of their degradation remain the same. What risks to pastures and lands in light of climate change should we expect and what measures should we take to minimize the harmful pressure?

What is the economic loss from the death cases and how it impacts on human capital?

- Note: It is known that climate warming aggravates the risk of malaria, infectious diseases, heat waves, etc. There are close linkages between the state of health and human capital (apart from education, capacity and skills). What is the economic value of a human life and how its loss can trigger the human capital?

While conducting the research projects and case studies, the representatives of the stakeholder engagement platform stressed the importance taking into account the points listed in Box 8.

Still, some bilateral meetings with the national counterparts revealed that there is a need for collaborative research within the existing initiatives on climate change in Tajikistan. Most of them can benefit from the PRISE project, in terms of additional assessments and studies. Based on the institutional assessment report (UNDP, 2012a) it is important to develop the Public Climate Expenditures Review, which can show how the country has spent/spending on climate adaptation interventions both at the national and local level. This is especially important due to recent development and expansion of the projects targeting on climate change and resilience in the country.

Box 8: Stakeholder engagement platform considerations

- To use **existing studies and assessments**, which are available in the country; yet, the reference is to make a more detailed assessment of drought impact on land degradation, different crops and its varieties in Tajikistan. On the other hand, within the National Program on agricultural reform until 2020, it is possible to complement existing recommendations, i.e. on **crop diversification** and cultivation of **drought-resistant varieties of crops**.
- To **map drought** and **flood prone areas** (to the details possible – for example, at the level of districts) with its direct link to climate change and clearly defined time scales (long-term, mid-term). The methodology should include not only data collection and modeling but also expedition and field observation works.
- To close a gap between extreme weather events and their impact on agricultural development and security, it is important to assure the regular service of **agro-meteorological forecasts** to the farmers. The existing tools should be studied in details.
- To study **sensitivity** rather than vulnerability of the local communities to climate risks, especially focusing on socio-economic development and different target groups: small entrepreneurs, women, and old people. Numerous studies conducted by civil society organizations show that the impact of climate change is perceived by these categories of people differently; hence, adaptation measures can be diverse and complex. To back up the latter, there's a need to conduct an **adaptation needs assessment** at the community-based level.
- To increase a **share of the state budget** for attaining new technologies and methods of agricultural development in light of climate change. The key player can be the Academy of agricultural sciences, department of innovative technologies, etc.
- To conduct a research on how to close the gap between the **sector-based adaptation strategies** and **local adaptation needs**; including social aspects, access to finance and technologies and the involvement of the private sector.
- To **involve private sector** to adaptation activities and **assess their opportunities and risks** in light of climate change.
- To assess the opportunities for the **development of community-based markets**, especially in terms of agro supply chain: how the agro products are cultivated, stored, transported, etc.
- To study **ecosystem services principles** and use the approaches (linked to adaptation and rational use of natural resources), which proved efficient in other countries (e.g. Kyrgyzstan – Reward for Ecosystem Services in Issyk-Kul).
- To **study the loss effect from the death cases** (especially for those, associated with climate change: malaria, infectious diseases, heat waves, etc.) and its impact on human capital.
- To undertake a more **detailed study of migration and its impact** (positive and negative) on human capital in the country, especially assessing the share of remittances on local economic development, education, health, etc.

5. Conclusion

Boy.
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It is obvious that climate change is an integral part of sustainable and resilient development. Despite the efforts Tajikistan is now making to adapt to climate impacts and reduce vulnerability, the perception of climate change as a purely environmental issue is the main challenge. The main findings of the present report show that the key national strategies on development and poverty reduction in Tajikistan do not overwhelmingly recognize climate resilient measures, especially for the climate-sensitive economic sectors, such as energy, agriculture, water management, and forestry. The impact of climate change on the state of health and security is also evident. However, the existing healthcare system possesses limited capacity to enlarge its agenda to climate change and potential risks for human health. In spite of the recognized fact that a risk of water-borne infectious diseases, heat waves, and malaria is increasing due to climate warming, the solution is rather based on a short term/ad-hoc measures.

The most vulnerable population is those located in rural areas. It comprises to 75% out of the total number. The rural population is mostly involved in agricultural activity and farming. The observations show that agriculture is the most sensitive to climate risks in Tajikistan. Widespread land degradation, inefficient irrigation system coupled with increased aridity of the region and uneven distribution of atmospheric precipitation pose a serious risk to the country's food security. The energy sector is also highly vulnerable to climate change. Ninety-eight percent of Tajikistan power comes from hydroelectric sources, and the river basins in which hydropower facilities are located depend upon glacial water and snowmelt. For Tajikistan, it is crucial to determine what adaptation to climate change specifically entails and which measures and approaches really help to increase the resilience of the affected local population. The success or failure of adaptation measures will become evident at the local level in people's livelihoods.

It is expected that new research projects linking climate resilience with development in the frames of the PRISE initiative in Tajikistan will support the mainstreaming of the research findings into development policy of the country, and serve as an evidence base for existing and planned initiatives and projects on climate change.

Annex and References

Annex 1:
Economic and social indicators, Tajikistan 2009-2016

Annex 2:
Climate change vulnerability in Tajikistan

Annex 3:
Key programs, law and agreements

Annex 4:
Reflection of climate change in mandates and scope of work of key ministries and departments

References

Annex 1: Economic and social indicators, Tajikistan 2009-2016

	Year						Projections	
	2009	2010	2011	2012	2013	2014a	2015b	2016b
Income and Economic Growth								
GDP growth (percent change)	3.9	6.5	7.4	7.5	7.4	6.7	6.0	6.3
GDP per capita (USD)	662	741	836	951	1040	1132	1123	1197
Gross fixed investment c	14.3	12.9	15.5	14.9	14.1	14.5	15.2	15.4
Public	13.3	10.9	12.5	10.9	9.3	10.2	10.5	10.5
Private	1.0	2.0	3.0	4.0	4.8	4.3	4.7	4.9
Savings	12.8	20	18.1	17.7	18.4	15.8	16.3	16.4
Public	7.8	7.2	10	9.5	6.7	9.3	9.2	9.2
Private	5.0	12.9	8.1	8.2	11.7	6.5	7.1	7.2
Money and Prices								
Consumer price inflation (percent change, year-end)	5	9.8	9.3	6.4	3.7	7.4	7.5	7.5
Consumer price inflation (percentage change, annual average)	6.5	6.4	12.4	5.8	5.1	6.1	6.9	7.1
Average exchange rate (TJS/USD)	4.14	4.38	4.61	4.76	4.77	4.93	…	…
Real effective exchange rate index (2005=100)	97	92.1	90.9	92.4	95.1	…	…	…
Fiscal								
Revenue and grants	23.4	23.2	24.9	25.2	28.1	28.0	27.6	28.0
Expenditure and net lending	28.8	26.9	27.3	25.1	29.2	29.0	29.1	29.4
Fiscal balance	-5.4	-3.7	-2.5	0.1	-1.1	-1.0	-1.5	-1.4
External public debt (USD million)	1,691	1,943	2,124	2,169	2,248	2,253	2,501	2,683
External public debt	35.8	34.4	32.6	28.6	25.4	25.8	26.5	26.1
Total public debt	36.6	37.6	35.0	32.6	31.0	30.9	30.7	30.4
External Accounts								
Export growth of goods and services (percent change)	-12.7	14.7	34.8	18.6	15.0	3.6	11.2	11.6
Import growth of goods and services (percent change)	-26.7	9.4	47.6	11.7	15.8	7.3	4.5	4.8
Export of goods and services (USD million)	755	866	1 167	1 384	1 592	977.4	1 885	2 104
Import of goods and services (USD million)	2 714	2 968	4 382	4 894	5 671	4338.8	6 272	6 574

	Year						Projections	
	2009	2010	2011	2012	2013	2014a	2015b	2016b
Workers' remittances, net (USD million)	1,622	2,122	2,844	3,557	4,243	4,199	4,283	4,377
Percent of GDP	32.6	39.8	46.2	47.5	48.2	46.2	43.3	40.7
Current account balance (USD million)	-295	-69	-305	-99	-60	-336	-386	-408
Percent of GDP	-5.9	-1.2	-4.7	-1.3	-0.7	-3.7	-3.9	-3.8
Foreign direct investment (USD million)	16	16	65	146	105	137	178	231
Population, Employment and Poverty								
Population (millions)	7.5	7.6	7.8	8	8.2	8.4	8.6	8.8
Population growth (percent change)	2.2	1.1	2.6	2.3	2.4	2.4	2.4	2.4
Unemployment rate (percent of labor force)	2	2.1	2.4	2.4	2.4	…	…	…
Poverty headcount (percent of the population at national poverty line)	47.2	…	…	…	…	…	…	…
At $1.25 a day PPP	6.6	…	…	…	…	…	…	…
At $2 a day PPP	27.7	…	…	…	…	…	…	…
Gini coefficient (income)	30.8	…	…	…	…	…	…	…
Life expectancy (years)	67	67	67.1	…	…	…	…	…
Other								
GDP (TJS millions)	20,623	24,705	30,069	36,161	40,507	45,605	52,626	60,137
GDP (USD millions)	4,981	5,642	6,523	7,593	8,495	9,250	9,892	10,758
Doing Business rank d	159	152	139	147	141	143	…	…
Human Development Index rank e	127	127	127	125	133	…	…	…
CPIA (overall rating)	3.2	3.3	3.4	3.4	3.3	…	…	…
Economic management	3.5	3.7	3.8	3.8	3.8	…	…	…
Structural policies	3.2	3.2	3.2	3.2	3	…	…	…
Social inclusion and equity policies	3.4	3.4	3.5	3.5	3.4	…	…	…
Public `sector management and institutions	2.7	2.8	2.9	3	3	…	…	…

Sources: TajStat, NBT, Ministry of Finance, IMF, World Bank.

Notes: "..." indicates that data are not available.

a Estimates.
b Projections.
c Domestic investments excluding changes in stocks.
d Out of 175 countries in 2007, 178 in 2008, 181 in 2009, 183 in 2010 and 2011, 185 in 2012, and, 189 in 2013.
e Out of 177 countries from 2005 to 2008, 181 in in 2009,169 in 2010, 187 in 2011, and 195 in 2013 (estimates for 2012).

Annex 2: Climate change vulnerability in Tajikistan

Climatic change	Impact	Sector vulnerabilities	Adaptive capacity
Warming above the global mean in central Asia	Increase in average plain region temperatures of 0.5°-0.8° C and mountain region temperatures of 0.3°-0.5° C in 60 year period.	• Glacier stock changing with increased warming, especially in high-altitude areas such as Pamir, Zeravshan and Pamir-Alai. • Extinction of natural ecosystem and species such as the Marmota menzbieri previously found in Northern Tajikistan. • Increased vulnerability of human health to malaria, infectious and non-infectious diseases	Very limited understanding of how these particular changes in climate will impact people, lives and livelihoods in Tajikistan. Poor understanding coupled with issues of limited resources has resulted in weak adaptive capacity to climate change. The challenges are compounded by the fact that in almost all areas the scientific evidence and data is very poor, making adequate adaptive responses next to impossible. Gaps in the basic institutional framework, include: • Weakness in national systems for acquiring and managing meteorology and hydrology data, with severe implications for assessing near and longer term climate trends, and limited access to climate change information; • Low awareness of government officials, academia, business circles, and the public on the adverse risks and impacts of climate change, and limited technical skill pool; • Lack of integration of climate change risk in national development strategies and sectoral investment plans.
Decrease in precipitation in the summer	The number of days with precipitation has decreased in the country.	• Water flow of Varzob River – most significant source of water supply for Dushanbe – closely linked with precipitation patterns, especially in the mountains.	
Reduction in snow and ice	Continuous periods, such as from 1970-1984 with low amounts of rainfall	• Direct impact on river water availability, size of snowmelt flood and level of moisture in soil.	
Increasing frequency and intensity of extreme events particularly, intense rainfall events causing landslides and severe floods	Heavy rains, high waters caused by mudflow, high air temperature accompanied by droughts, strong winds and dust storms, frosts and extreme cold temperature cause most damage to agriculture.	• Agricultural challenges such as irreparable damage to cotton crop especially in Spring • Hail damages plants, breaking stems and reducing the quality and yield of crops.	

Source: Adapted from the SPCR 2010

Annex 3: Key programmes, laws and agreements

- National Environmental Action Plan (NEAP, 2006) considers and recommends a broad scope of measures and improvements. The timeline of the implementation period is over. Update of the NEAP is expected.
- State Environment Program and State Ecological Education Program until 2020, which stimulate the increased awareness and education of the population and civil servants about environmental challenges and solutions. They properly reflect the issues of climate change, water and energy, protection of ozone layer and air quality.
- National Complex Program on the use of renewable energy sources until 2015 envisages a scope of measures to set up the manufacturing and maintenance infrastructure base for broader use of renewable energy, such as solar, wind, hydropower and geothermal. It also stimulates capacity building of specialists in the area of renewable energy.
- State Program for small HPP construction until 2020, which has already supported the launch of around 200 sHPPs in Tajikistan, using state budget, donor funds and private investments.
- Concept of the fuel and energy complex development until 2015 (adopted in 2002), considers the existing state of the energy sector, defines barriers and challenges preventing its development and recommends a scope of measures/activities for the future.
- Water Supply and Sanitation Strategy until 2015 and Program to improve access of the population to clean water until 2020 aim to reduce by half the number of population, not having access to clean water and sanitation by 2015.
- National Disaster Risk Management Strategy (NDRMS, adopted in 2010) and Action Plan for 2010-2015 envisage the supporting activities to reduce risks and optimize preparedness of the country to natural and climate related disasters as well as to strengthen capacity and awareness of the population about the risks and responses. The State Program for river bank protection for 2011-2015 is attached to these strategic documents.
    - Institutional structures of the disaster risk management program, including REACT The Rapid Emergency Assessment and Coordination Team (REACT)[11] and MEWS Monitoring and Early Warning System (MEWS).
- Agriculture reform Program of the Republic of Tajikistan for 2012-2020, which envisages a broader scope of socio-economic changes, aiming to improve livelihoods and support the private investments.
- Other interdepartmental programs, which are relevant to climate change adaptation and mitigation, include the State Forestry Program

Box A1: Key laws and regulations, relevant to climate change

- Law of the Republic of Tajikistan on energy (2000)
- Law of the Republic of Tajikistan on transport (2000)
- Law of the Republic of Tajikistan on ecological expertise (2012)
- Law of the Republic of Tajikistan on nature protection (2011)
- Law of the Republic of Tajikistan on ecological education (2010)
- Law of the Republic of Tajikistan on renewable energy (2010)
- Law of the Republic of Tajikistan on environmental information (2011)
- Law of the Republic of Tajikistan on energy saving and energy efficiency (2013)

[11] More details about the REACT and its terms of references are found at http://www.untj.net/index.php?option=com_phocadownload&view=category&id=129:react-strategic-documents&Itemid=746&lang=en

until 2015, State Program for protected areas until 2015 and State Program for monitoring and protection of glaciers until 2020.

International conventions, agreements and protocols:

- Vienna Convention for the protection of the ozone layer (1996);
- Montreal Protocol on substances that deplete the ozone layer and London amendment (1997);
- The UN Convention on biological diversity (1997);
- The UN Convention to combat desertification (1997);
- The UN Framework Convention on climate change (1998);
- Ramsar Convention on wetlands of international importance especially as waterfowl habitat (2000);
- Bonn Convention for the protection of the migratory species of wild animals (2000);
- Aarhus Convention on access to information, public participation in decision-making and access to justice in environmental matters (2001).

Annex 4: Reflection of climate change in mandates and scope of work of key ministries and departments

Key ministries

Ministry of Economic Development and Trade (MEDT)

The Ministry is the government agency tasked with overseeing the system of state economic planning and forecasting and facilitating the effective implementation of socio-economic development priorities in Tajikistan. One of the main tasks of the Ministry is to develop and implement economic development programs and strategies of the Republic of Tajikistan with the aim of reducing poverty and stabilizing socio-economic conditions. According to governmental regulations, the Ministry of Economy is to be included in all working groups that develop sustainable strategies, plans and budgets. Representatives of the Ministry head the editing group to prepare the country's National Development Strategy and the Poverty Reduction Strategy, and the Ministry also monitors the implementation of the two strategies. Among its other roles, MEDT is one of the co-executive bodies of the National Action Plan for Climate Change Mitigation.

Ministry of Agriculture

As the agency responsible for implementing sectoral strategies and activities in the agricultural sector, the Ministry oversees a significant segment of the economy that is vulnerable to climate change. The Ministry develops, creates and coordinates agricultural and regional policy, strategic plans, state and sectoral programs in the agricultural sector. Furthermore, the Ministry also oversees the work of the Academy of Agricultural Sciences, which serves as the scientific and coordination centre for agrarian science in Tajikistan. The work of the Academy of Agricultural Sciences is directly relevant to adaptation, as it conducts research on cotton, wheat, barley, and legume crops, including work on the introduction of high-yield varieties. The Ministry is also affiliated with Tajik Agrarian University, which has nine faculties. Both of these connections provide opportunities for applied research and knowledge transfer.

Ministry of Energy and Water Resources (MEWR)

MEWR is involved with climate change issues though its role as Designated National Authority for Clean Development Mechanism projects conducted under the Kyoto Protocol of the UNFCCC in Tajikistan. In other areas, the Ministry is tasked with the development of environmentally-friendly local and alternative energy sources. The activities of the Ministry are interlinked with the construction of hydropower plants and their reservoirs in two areas related to adaptation: a) providing the necessary flow regulation during the fluctuation and changes in water content; and b) reducing the negative impacts of silt on existing reservoirs. The Ministry

has offices in Dushanbe and experience with coordinating data flow, monitoring, and analysis under the National Development Strategy process.

On the other hand, the Ministry is responsible for the water policy in the country and the national irrigation system. It is involved in almost all emerging policies in the country, including the discussion of program action plans focusing on the environmental protection. The Ministry is participating in the development of the national water strategy based on the Millennium Development Goals. The Ministry also monitors the use of water resources, being responsible for the distribution of water to farmers for agricultural purposes, and provides data on water consumption to the Committee of Environmental Protection.

Ministry of Health

According to the Public Health Law, the Ministry provides sanitary-epidemiological services to the public. The Ministry of Health conducts the state sanitation-epidemiological supervision, carries out activities on environmental safety, environmental protection and sanitation, and develops and approves the state and industry health norms, regulations and hygiene standards. The Ministry has an affiliated research institute, the Institute of Epidemiology and Sanitation, and it also manages about 73 sanitary-epidemiological observation stations. The State Epidemiological Service, which functions as an independent agency, participated in a WHO regional project on health and climate change. The project team has drafted a Strategy for Health and Climate Change.

Ministry of Education

The Ministry is in charge of developing and implementing policies on all stages of education. It is relevant to climate change adaptation because of its mandate under the Law on Environmental Education, which allows it to develop and carry out environmental education projects. It is also important as the government institution that oversees schools, which can serve as effective entry points for awareness about climate change issues. The Ministry oversees the work of the Academy of Education. It also has an Institute for the Development, Publication, and Distribution of Textbooks, and it has its own publishing house for specialized journals and periodicals. Finally, it has its own centre for professional training. As the Ministry was re-organized in early 2012, specific data on personnel and capacity needs were not available at the time this report went to press.

Other Key Committees and Agencies

State Committee for Land Use, Geodesy, and Cartography

The Committee was established in 2011 and is responsible for developing policies on land use and land use reforms. It is one of the main agencies being responsible for the development of the Land Code. The Committee's functions including monitoring land resources, state control on efficient use and conservation of land, introduction of land inventory, state registration to legal land use, promoting the rational ways of the land use, defining land tax and land use fees for violation of land legislation, participation in decision-making regarding the rehabilitation of degraded land, and the preparation of documents for the distribution of land among various executive agencies. In addition, the Committee oversees LULUC-related issues in Tajikistan, and it oversees two institutes that conduct applied research relating to land use change, including land use inventories and mapping.

Committee for Emergency Situations and Civil Defense

The Committee is the government agency that is tasked with disaster risk reduction and response, which covers climate-induced natural disasters. The Committee conducts reviews and analysis of disaster risk assessment in light of climate change, and it has a department that focuses on evacuation and re-settlement. In terms of facilities, the Committee has its headquarters in Dushanbe and representatives in every region and district of the country. The Committee has its own training facilities, and it offers in-service training for its employees.

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The Regional Environment Centre for Central Asia (CAREC)
40, Orbita-1, 050043, Almaty
Republic of Kazakhstan

Tel: +7 (727) 265 4333; 265 4334
Fax: +7 (727) 265 4325
Email: info@carececo.org

www.carececo.org

www.prise.odi.org
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This work was carried out under the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA), with financial support from the UK Government's Department for International Development (DfID) and the International Development Research Centre (IDRC), Canada. The views expressed in this work are those of the creators and do not necessarily represent those of DfID and IDRC or its Board of Governors.

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